OF THE PROPERTIES OF

SATURATED STEAM

AND OTHER VAPORS.

BY

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SATURATED STEAM, AND OTHER VAPORS.

A COMPARISON of the several tables of the properties of saturated steam, expressed in English units, reveals discrepancies of considerable magnitude; and investigation shows that, while all are in some manner founded on the experiments of Regnault, various methods of calculation have been used, and in some cases other experimental data have been employed. A review of the whole subject, in connection with the preparation of notes on thermodynamics for the use of the students of the Massachusetts Institute of Technology, made it seem important to calculate a set of tables, to accompany those notes, founded on the best and most recent data.

In presenting the tables for general use, it appears proper to state in full the data and the methods of calculation employed, so that each one may see the degree of accuracy and correctness of the tables, and the reliance to be placed on them.

Tables of the properties of other vapors have been added, which will be discussed hereafter.

Pressure of Saturated Steam. — As a conclusion from all the experiments on the tension of saturated steam, Regnault gives, in the *Mémoires de l'Institut de France, etc.*, *Tome XXI.*, the following data: —

TEMPERATURE C.	PRESSURE MM. OF MERCURY.
—32	0.32
—16	1.29
0	4.60
25	23.55
50	91.98
75	288.50
100	760.00
130	2030.0
160	4651.6
190	9426.
220	17390.

From these data he calculated, by the aid of seven-place logarithms, the following formulæ, which give the pressure in millimetres of mercury for any temperature in degrees Centigrade: —

A. For steam from $-32°$ to $0°$ C.

$$p = a + b\alpha^n.$$
$$a = -0.08038.$$
$$\log b = 9.6024724 - 10.$$
$$\log \alpha = 0.033398.$$
$$n = 32° - t.$$

B. For steam from $0°$ to $100°$ C.

$$\log p = a - b\alpha^n + c\beta^n.$$
$$a = 4.7384380.$$
$$\log b = 0.6116485.$$
$$\log c = 8.1340339 - 10.$$
$$\log \alpha = 9.9967249 - 10.$$
$$\log \beta = 0.006865036.$$
$$n = t.$$

C. For steam from $100°$ to $220°$ C.

$$\log p = a - b\alpha^n + c\beta^n.$$
$$a = 5.4583895.$$
$$\log b = 0.4121470.$$
$$\log c = 7.7448901 - 10.$$
$$\log \alpha = 9.997412127 - 10.$$
$$\log \beta = 0.007590697.$$
$$n = t - 100.$$

D. For steam from $-20°$ to $220°$ C.

$$\log p = a - b\alpha^n - c\beta^n.$$
$$a = 6.2640348.$$
$$\log b = 0.1397743.$$
$$\log c = 0.6924351.$$
$$\log \alpha = 9.994049292 - 10.$$
$$\log \beta = 9.998343862 - 10.$$
$$n = t + 20.$$

By aid of the formulæ *A* and *B*, Regnault calculated and recorded tables of the pressures of saturated steam for temperatures from $-32°$ to $100°$ C. The formula *D* was calculated from the data given above for the temperatures $-20°$, $+40°$, $100°$, $160°$, and $220°$ C., and was intended to represent the whole range of experiments. By this formula, instead of formula *C*, he calculated the pressures set down in his tables for temperatures from $100°$ C. to $220°$ C.

that differ but little from those that will be given later. Some of the more recent tables in the French system were calculated by his equations.

Equations for the Pressure of Steam at Paris. — In view of the preceding statements, it appeared desirable to re-calculate the constants for Equations B and C, with a degree of accuracy that should exclude any doubt as to the reliability of the results. Accordingly, the logarithms required were taken from Vega's ten-place table, and then the remainder of the calculations were carried on with natural numbers, checking by independent methods, with the following results: —

B. For steam from 0° to 100° C.

$$\log p = a - b\alpha^n + c\beta^n.$$
$$a = 4.7393622142.$$
$$\log b = 0.6117400190.$$
$$\log c = 8.1320378383 - 10.$$
$$\log \alpha = 9.996725532820 - 10.$$
$$\log \beta = 0.006864675924.$$
$$n = t.$$

C. For steam from 100° to 220° C.

$$\log p = a - b\alpha^n + c\beta^n.$$
$$a = 5.4574301234.$$
$$\log b = 0.4119787931.$$
$$\log c = 7.7417476470 - 10.$$
$$\log \alpha = 9.99741106346 - 10.$$
$$\log \beta = 0.007642489113.$$
$$n = t - 100.$$

To show the degree of accuracy attained, the following tables are given: —

Equation B.

t.	p.	LOG p FROM TABLE OF LOGARITHMS.	LOG p CALCULATED BY EQUATION.
0	4.60	0.6627578317	. . . .
25	23.55	1.3719909115	1.37199097
50	91.98	1.9636934052	1.96369346
75	288.50	2.4601458175	2.46014587
100	760	2.8808135923	2.88081365

Equation C.

t.	p.	LOG p FROM TABLE OF LOGARITHMS.	LOG p CALCULATED BY EQUATION.
100	760.00	2.8808135923	. . . .

C and the numerical work was not carried to so large a number of decimal places. For the calculation of tables, the constants are carried to seven places of significant figures only; this gives six significant figures in the result, of which five are recorded in the table.

Pressure of Steam at Latitude 45°.—French System.—It is customary to reduce all measurements to the latitude of 45°, and to sea-level. The standard thermometer should then have its boiling and freezing points determined under, or reduced to such conditions. The value of g, the acceleration due to gravity, is, at Paris, latitude 48° 50′ 14″ and 60 metres above sea-level, 9.809218 metres; and at 45°, and at sea-level, it is 9.806056 metres. Consequently, 760 mm. of mercury at 45° gives a pressure equal to that of 759.755 mm. at Paris; and this corresponds to a temperature of 99.°991 C.

In other words, the thermometer which is standard at 45° has each degree 0.99991 of the length of the degree of a thermometer standard at Paris.

To reduce Equation B to 45° latitude, we have

$$\log p = a + \log \frac{980.9218}{980.6056} - b\alpha^{0.99991t} + c\beta^{0.99991t};$$

and for Equation C,

$$\log p = a + \log \frac{980.9218}{980.6056} - b\alpha^{(0.99991t-100)} + c\beta^{(0.99991t-100)}$$

$$= a + \log \frac{980.9218}{980.6056} - b\alpha^{-0.009}\, \alpha^{0.99991(t-100)} + c\beta^{-0.009}\, \beta^{0.99991(t-100)}.$$

The resulting equations which were used in calculating Table III are

B. For steam from 0° to 100° C. at 45° latitude.

$$\begin{aligned}
\log p &= a_1 - b\alpha_1^n + c\beta_1^n. \\
a_1 &= 4.739502. \\
\log b &= 0.6117400. \\
\log c &= 8.13204 - 10. \\
\log \alpha_1 &= 9.996725828 - 10 \\
\log \beta_1 &= 0.0068641. \\
n &= t.
\end{aligned}$$

C. For steam from 100° to 220° C. at 45° latitude.

$$\begin{aligned}
\log p &= a_1 - b_1\alpha_1^n + c_1\beta_1^n. \\
a_1 &= 5.457570. \\
\log b_1 &= 0.4120021. \\
\log c_1 &= 7.74168 - 10. \\
\log \alpha_1 &- 9.997411296 - 10. \\
\log \beta_1 &= 0.0076418. \\
n &= t - 100.
\end{aligned}$$

equations for the pressure of steam, so that they will give the pressures in pounds on the square inch for degrees Fahrenheit, there are required the comparison of measures of length, and of weight, the comparison of the scales of the thermometers, and the specific gravity of mercury.

Professor Rogers (*Proceedings of the Am. Acad. of Arts and Sciences, 1882–83*, also *Additional Observations*, etc.) gives for the length of the metre, 39.3702 inches. This differs from the value given by Capt. Clarke (*Proceedings of the Royal Society, vol. xv., 1866*), by an amount that does not affect the values in the tables; his value being 39.370432 inches.

Professor Miller (*Phil. Transactions, cxlvi., 1856*) gives for the weight of one kilogram, 2.20462125 pounds.

Regnault gives, for the weight of one litre of mercury, 13.5959 kilograms.

The degree Fahrenheit is $\frac{5}{9}$ of the length of the degree Centigrade.

Let
$$k = \frac{13.5959 \times 2.204621}{39.3702^2};$$

then the equations B and C have for the reduction to degrees Fahrenheit, and pounds on the square inch,

$$\log p = a_1 + \log k - b\alpha^{\frac{5}{9}n} + c\beta^{\frac{5}{9}n},$$
$$\log p = a_1 + \log k - b_1\alpha_1^{\frac{5}{9}n} + c_1\,\beta_1^{\frac{5}{9}n}.$$

The resulting equations, which were used in calculating Tables I and II, are: —

B. For steam from 32° to 212° F., in pounds on the square inch.

$$\log p = a_2 - b\alpha_2^{\,n} + c\beta_2^{\,n}.$$
$$a_2 = 3.0259908.$$
$$\log b = 0.6117400.$$
$$\log c = 8.13204 - 10.$$
$$\log \alpha_2 = 9.998181015 - 10.$$
$$\log \beta_2 = 0.0038134.$$
$$n = t - 32.$$

C. For steam from 212° to 428° F., in pounds on the square inch.

$$\log p = a_2 - b_1\alpha_2^{\,n} + c_1\beta_2^{\,n}.$$
$$a_2 = 3.743976.$$
$$\log b_1 = 0.4120021.$$
$$\log c_1 = 7.74168 - 10.$$
$$\log \alpha_2 = 9.998561831 - 10.$$
$$\log \beta_2 = 0.0042454.$$
$$n = t - 212.$$

All of the foregoing equations make the pressure a function of the tem-

Other Equations for the Pressure of Steam. — Rankine, in his *Steam Engine and other Prime Movers*, gives the following equation: —

$$\log p = A - \frac{B}{T} - \frac{C}{T^2}.$$

For pounds on the square inch, corresponding to degrees Fahrenheit, —

$$A = 6.1007.$$
$$\log B = 3.43642.$$
$$\log C = 5.59873.$$
$$T = t + 461.^{\circ}2 \text{ F}.$$

This equation has been largely used for calculating tables on the English system. The following table will give a comparison between the results from this formula and those from Formulæ B and C.

TEMPERATURE.	PRESSURE.	
	Regnault at 45° latitude.	Rankine.
32	0.0890	0.083
77	0.4555	0.452
122	1.7789	1.78
167	5.579	5.58
212	14.99	14.70
257	33.711	33.71
302	69.27	69.21
347	129.79	129.8
392	225.56	225.9
428	336.26	336.3

Differential Co-efficient $\frac{dp}{dt}$. — As will be seen later, the differential co-efficient $\frac{dp}{dt}$ is used in calculating the volume and density of saturated vapors.

From the general equation of the form,

$$\log p = a + b\alpha^n + c\beta^n,$$

differentiation gives

$$\frac{1}{p}\frac{dp}{dt} = \frac{1}{M^2} b \log \alpha \cdot \alpha^n + \frac{1}{M^2} c \log \beta \cdot \beta^n,$$

in which M is the modulus of the common system of logarithms.

The equation may be written, —

$$\frac{1}{p}\frac{dp}{dt} = A\alpha^n + B\beta^n.$$

French units.

B. For 0° to 100° C., mm. of mercury,

$$\log A = 8.8512729 - 10.$$
$$\log B = 6.69305 - 10.$$
$$\log \alpha_1 = 9.996725828 - 10.$$
$$\log \beta_1 = 0.0068641.$$

C. For 100° to 220° C., mm. of mercury.

$$\log A = 8.5495158 - 10.$$
$$\log B = 6.34931 - 10.$$
$$\log \alpha_1 = 9.997411296 - 10.$$
$$\log \beta_1 = 0.0076418.$$

English units.

B. For 32° to 212° F., pounds on the square inch.

$$\log A = 8.5960005 - 10.$$
$$\log B = 6.43778 - 10.$$
$$\log \alpha_2 = 9.998181015 - 10.$$
$$\log \beta_2 = 0.0038134.$$

C. For 212° to 428° F., pounds on the square inch,

$$\log A = 8.2942434 - 10.$$
$$\log B = 6.09403 - 10.$$
$$\log \alpha_2 = 9.998561831 - 10.$$
$$\log \beta_2 = 0.0042454.$$

Heat of the Liquid and Specific Heat.—A preliminary series of experiments convinced Regnault that the specific heat of water at low temperature is unity. To test the specific heat at higher temperatures, he ran hot water from a boiler, and at a known temperature, into a calorimeter in which the temperature varied from 8° to 14° C., and the resulting upper temperature varied from 17° to 29° C. Knowing the original weight of water in the calorimeter, the weight run in from the boiler, and the initial and final temperatures in the calorimeter, he calculated the mean specific heat of water between the temperature of the boiler and the final temperatures of the calorimeter. A series of forty such experiments was made, with the temperature of the boiler varying from 108° to 192° C., from which Regnault concluded that the mean specific neat from 0° to 100° is 1.005; and from 0° to 200°, 1.016. The corresponding heat of the liquid, i.e., the heat required to raise one kilogram of water from 0° to a given temperature, t, is

For 100° 100.5

and solving for the two constants by aid of the two known values of q, the following equation, which is commonly used, is deduced:—

$$q = t + 0.00002t^2 + 0.0000003t^3.$$

The specific heat at any temperature is, therefore,—

$$c = \frac{dq}{dt} = 1 + 0.00004t + 0.0000009t^2.$$

These equations are for use with the Centigrade scale; for the Fahrenheit scale, a given temperature may be reduced to the Centigrade scale, and then introduced in the same equations.

The process of making the experiments is really a complex one; for the water, in leaving the boiler, has work done on it by the steam pressure in the boiler, and it has a certain velocity impress on it at the same time, and again, in entering the calorimeter, it does work against the atmospheric pressure, and the kinetic energy of its motion is changed into heat. At higher temperatures there is a double change of state; part of the water changes to steam on leaving the boiler, and that steam is condensed again in the calorimeter. It is probable that the error of neglecting the effect of these several actions is inconsiderable.

The degree of accuracy to be accorded to this work is indicated by the fact that Regnault gives four significant figures in stating the data for the calculation of the constants in the equations.

Rowland's Experiments.—A series of experiments was made by Rowland at Baltimore, to determine the mechanical equivalent of heat, which gave a delicate method of determining the heat of the liquid, and the specific heat.

The apparatus used was similar to that used by Joule, with modifications to give greater certainty of results. The calorimeter was of larger size, and the paddle had the upper vanes curved like the blades of a centrifugal pump, to give a strong circulation up through the centre, past the thermometer for taking the temperatures, and down at the outside. The paddle was driven by a petroleum engine, and the power applied was measured by making the calorimeter into a friction brake, with two arms at which the turning moment was measured. Radiation was made as small as possible, and then was made determinate by use of a water-jacket outside of the calorimeter.

The experiments consisted essentially in delivering a measured amount of work to the water in the calorimeter, and in noting the rise of temperature produced thereby.

The whole range covered by the experiments was from 2° to 41° C. The results show that 430 kilogrammetres of work are required to raise one kilogramme of water from 2° to 3° C. Assuming that the same amount will be

Degrees, C.	Total Number of Kilogram-meters.	Mechanical Equivalent of Heat.	Heat of the Liquid, Experimental.	Heat of the Liquid, Calculated.	Degrees, C.	Total Number of Kilogram-meters.	Mechanical Equivalent of Heat.	Heat of the Liquid, Experimental.	Heat of the Liquid, Calculated.
1	430	–	1.0068	1.007	22	9424	426.1	22.065	22.063
2	860	–	2.0135	2.014	23	9850	426.0	23.063	23.061
3	1290	–	3.0204	3.022	24	10277	425.9	24.062	24.059
4	1721	–	4.0295	4.029	25	10701	425.8	25.055	25.058
5	2150	429.8	5.0339	5.036	26	11128	425.7	26.054	26.053
6	2580	429.5	6.0408	6.040	27	11553	425.6	27.050	27.048
7	3009	429.3	7.0452	7.045	28	11978	425.6	28.045	28.042
8	3439	429.0	8.0520	8.049	29	12399	425.5	29.031	29.037
9	3868	428.8	9.0564	9.054	30	12828	425.6	30.035	30.032
10	4296	428.5	10.059	10.058	31	13253	425.6	31.030	31.027
11	4723	428.3	11.058	11.060	32	13675	425.6	32.018	32.023
12	5151	428.1	12.061	12.061	33	14101	425.7	33.016	33.018
13	5578	427.9	13.060	13.063	34	14527	425.7	34.011	34.014
14	6006	427.7	14.063	14.064	35	14952	425.8	35.008	35.009
15	6433	427.4	15.065	15.066	36	15379	425.8	36.008	36.007
16	6861	427.2	16.064	16.066	37	15805	–	37.007	37.005
17	7289	427.0	17.066	17.066	38	16231	–	38.003	38.004
18	7717	426.8	18.068	18.066	39	16657	–	39.000	39.002
19	8144	426.6	19.068	19.066	40	17083	–	39.998	40.000
20	8571	426.4	20.068	20.066	41	17508	–	40.993	–
21	8997	426.2	21.065	21.064					

In the above table, column 1 gives the number of degrees above freezing on the Centigrade scale; column 2 gives the number of kilogrammetres required to raise one kilogramme of water from freezing point to the given temperature; column 3 is Rowland's mechanical equivalent of heat at the given temperature derived from 10° intervals on column 2; column 4 is obtained by dividing the numbers in column 2 by the mechanical equivalent of heat at $16\frac{2}{3}$° C., or 62° F., from column 3; and column 5 is calculated by considering the specific heat to be constant for each five degrees of temperature. These specific heats were derived from a curve obtained by plotting temperatures for abscissæ, and heats of the liquid for ordinates. The values of the specific heats will be given later, in connection with those for higher temperatures.

A review of the preceding table shows that the specific heat at low temperatures varies quite markedly, so that it appeared advisable to investigate the effect of this variation on Regnault's experiments already quoted. This was done quite expeditiously by multiplying the mean specific heat given by him for his several experiments by the true average specific heat for the range of temperature in the calorimeter. This corrected specific heat was

temperature of the boiler. The results were then plotted as before, and compared with the heats of the liquid derived from Regnault's mean specific heats uncorrected. The points by the corrected method were a little more regularly arranged than the points obtained by assuming the specific heat to be unity at low temperatures; but the improvement was inconsiderable. The inequality of the specific heat at low temperatures is seldom so much as the unavoidable errors of the method.

It appeared, that if the specific heat was assumed to be constant, from 40° to 45°, from 45° to 155°, and from 155° to 200° C., the straight lines thus drawn represented the experimental values as recalculated quite nearly; and, further, they represented the uncorrected experimental values more nearly than Regnault's equation.

Specific Heat of Water. — The combination of Rowland's and Regnault's experiments on the heat of the liquid by the method described gives the specific heats set down in the following table, Centigrade scale: —

					Specific Heat.
From 0°	to 5° C.	32°	to 41° F.	. . .	1.0072
5°	10°	41°	50°	. . .	1.0044
10°	15°	50°	59°	. . .	1.0016
15°	20°	59°	68°	. . .	1.
20°	25°	68°	77°	. . .	0.9984
25°	30°	77°	86°	. . .	0.9948
30°	35°	86°	95°	. . .	0.9954
35°	40°	95°	104°	. . .	0.9982
40°	45°	104°	113°	. . .	1.
45°	155°	113°	311°	. . .	1.008
155°	200°	311°	392°	. . .	1.016

Thermal Unit. — Heat is measured in calories, or British thermal units (*BTU*). A calorie commonly is defined as the heat required to raise one kilogramme of water from freezing point to 1° C.; and a British thermal unit, that required to raise one pound from 32° to 33° F. Nothing is known about the specific heat of water from 0° to 2° C.; consequently the commonly accepted value of the thermal unit is an ideal quantity inferred from the behavior of water at higher temperatures. It is more scientific to take an easily verified quantity for the standard; and there is a practical convenience in choosing 62° F. for the standard temperature, because it is near the mean temperature of the air during experimental work. Therefore, it is near the mean temperature in the calorimeter during ordinary work with that instru-

one pound of water from 62° to 63° F. This agrees substantially with the definition of the calorie, as the heat required to raise one kilogramme of water from 15° to 16° C.

In the tables for other vapors than steam, the old definition for the calorie, and Regnault's value for the heat of the liquid, are retained, to avoid entire recalculation.

Mechanical Equivalent of Heat. — The mechanical equivalent in metre-kilogrammes of one calorie at $16\frac{2}{3}$° C., deduced from Rowland's experiments in the third column of the table on page 58, is 427.1.

Since the value given by Joule is commonly quoted, it will be of interest to make a comparison of his latest work (1873) with Rowland's, as given in the following table: —

Temperature.	Joule's Value at Manchester, English System.	Reduced to the Air Thermometer and to the latitude of Baltimore.		Rowland's Value, corresponding.
		English.	French.	
14.7°	772.7	776.1	425.8	427.6
12.7°	774.6	778.5	427.1	428.0
15.5°	773.1	776.4	426.0	427.3
14.5°	767.0	770.5	422.7	427.5
17.3°	774.0	777.0	426.3	426.9

The value of g at Baltimore, latitude 39° 17′, is 980.05 centimetres therefore, reducing to 45° of latitude, and at the sea level, the value of the mechanical equivalent of heat is

$$J = 426.9.$$

To reduce to the English system, multiply by $\frac{9}{5}$, and by the length of the metre in feet, so that

$$J = 778.$$

Total Heat. — This term is defined as the heat required to raise a unit of weight of water from freezing point to a given temperature, and to entirely evaporate it at that temperature. The experiments made by Regnault were in the reverse order; that is, steam was led from a boiler into the calorimeter, and there condensed. Knowing the initial and final weights of the calorimeter, the temperature of the steam, and the initial and final temperatures of the water in the calorimeter, he was able, after applying the necessary corrections, to calculate the total heats for the several experiments.

As a conclusion of the work, he gives the following values for the total heats: —

10°	610	By equation, 609.6

Assuming an equation of the form

$$\lambda = A + Bt,$$

Regnault calculated the constants from the values given for 100° and 195°, and gives the equation

$$\lambda = 606.5 + 0.305t.$$

Wishing to see the effect of the varying value of the specific heat at low temperatures, I recalculated the total heats given by experiment, by a method resembling that used in recalculation of the heats of the liquid, and plotted the results together with Regnault's values uncorrected. The recalculated points were a little more regular than the original ones, and lay nearer the line represented by the above equation. Especially did the recalculated points for those experiments, for which the true mean specific heat of the water in the calorimeter was nearly unity, lie near that line. It therefore appears that the equation represents our best knowledge of the total heat of steam.

For the Fahrenheit scale the equation becomes

$$\lambda = 1091.7 + 0.305\ (t - 32).$$

Heat of Vaporization. — If the heat of the liquid be subtracted from the total heat, the remainder is called the heat of vaporization, and is represented by r, so that

$$r = \lambda - q.$$

Internal and External Latent Heat. — The heat of vaporization overcomes external pressure, and changes the state from liquid to vapor at constant temperature and pressure. Let the specific volume of the saturated vapor be s, and that of the liquid be σ, then the change of volume is $s - \sigma = u$, on passing from the liquid to the vaporous state. The external work is

$$p(s - \sigma) = pu,$$

and the corresponding amount of heat, or the external latent heat, is

$$Ap(s - \sigma) = Apu,$$

A being the reciprocal of the mechanical equivalent of heat.

The heat required to do the disgregation work, or the internal latent heat, is

$$\rho = r - Apu.$$

Specific Volume and Density of Steam. — On account of the great difficulty of direct determination of the weight of saturated steam, it is customary to calculate the specific volume of steam by aid of the following equation, derived by the application of the principles of thermo-dynamics to the general

in which A is the reciprocal of the mechanical equivalent of heat, T is the temperature from the absolute zero, and σ is the volume of one unit of weight of the liquid from which the vapor is formed. The differential co-efficient $\frac{dp}{dt}$ can be calculated by aid of the equations on page 11.

The absolute temperature is obtained by adding 273.7 to the temperature in degrees Centigrade, or 460.7 to the temperature in degrees Fahrenheit.

The volumes and densities of saturated steam given in Tables I, II, and III, were calculated by this method.

It is of interest to consider the degree of accuracy that may be expected from this method of calculating the density of saturated vapor. The value of r repends on λ and q; for the first, Regnault gives three figures in the data from which the empirical equation is deduced, and the experimental work does not indicate a greater degree of accuracy. The fourth figure, if stated, is likely to be in error to the extent of five units. The value of T is commonly stated in four figures, of which the last may be in error by two units. A, as determined by Rowland, has four figures, the last being uncertain to the extent of one or two units. The differential co-efficient $\frac{dp}{dt}$ is deduced from the equations for calculating p; and those equations are derived from data having five places of significant figures. Now the Equations B and C, for steam at 45° of latitude for the English system give a pressure of 14.6967 pounds on the square inch; but the specific volume calculated by aid of Equation B is 26.550 cubic feet, while Equation C gives 26.637 cubic feet. The mean, 26.60, differs from either extreme by about one in seven hundred. This discrepancy is due to the fact that the curves represented by Equations B and C meet at the common temperature, 212°, but do not have a common tangent. Since the equations are empirical and not logical, the error or uncertainty is unavoidable, and all calculated specific volumes are affected by a similar uncertainty. The greatest probable error is in determining r, for which it may be about one in one thousand. The error introduced into this equation by using the values of A in common use, that is, 772 instead of 778, is about one in one hundred.

Tate and Fairbairn's Experiments. — In 1860 an attempt was made by Tate and Fairbairn to determine the specific volume of steam by direct experiment. The following table, taken from the *Philosophical Transactions*, *Vol. cl.*, gives the results of all their experiments, together with the volumes calculated by their empirical formula,

	Pressure in Inches of Mercury. P.	Maximum Temperature, Fahrenheit, of Saturation. T	Specific Volume from Experiments. V.	Specific Volume from Formula. V.	Error of Formula.
1	5.35	136.77	8275.3	8183	$-\frac{1}{90}$
2	8.62	155.33	5333.5	5326	$-\frac{1}{762}$
3	9.45	159.36	4920.2	4900	$-\frac{1}{246}$
4	12.47	170.92	3722.6	3766	$+\frac{1}{87}$
5	12.61	171.48	3715.1	3740	$+\frac{1}{149}$
6	13.62	174.92	3438.1	3478	$+\frac{1}{86}$
7	16.01	182.30	3051.9	2985	$-\frac{1}{46}$
8	18.36	188.30	2623.4	2620	$+\frac{1}{814}$
9	22.88	198.78	2149.5	2124	$-\frac{1}{90}$
1′	53.61	242.90	943.1	937	$-\frac{1}{157}$
2′	55.52	244.82	908.0	906	$-\frac{1}{454}$
3′	55.89	245.22	892.5	900	$+\frac{1}{111}$
4′	66.84	255.50	759.4	758	$-\frac{1}{719}$
5′	76.20	263.14	649.2	669	$+\frac{1}{32}$
6′	81.53	267.21	635.3	628	$-\frac{1}{91}$
7′	84.20	269.20	605.7	608	$+\frac{1}{354}$
8′	92.23	274.76	584.4	562	$-\frac{1}{26}$
9′	96.08	273.30	543.2	545	$+\frac{1}{271}$
10′	99.60	279.42	515.0	519	$+\frac{1}{128}$
11′	104.54	282.58	487.2	496	$-\frac{1}{407}$
12′	112.78	287.25	458.3	461	$+\frac{1}{152}$
13′	122.25	292.53	433.1	428	$-\frac{1}{86}$
14′	114.25	288.25	449.6	456	$+\frac{1}{75}$

It is apparent that the errors of this formula are much larger than the probable errors of the thermo-dynamic method.

The following table, giving the volumes in cubic metres of one kilogramme of saturated steam, shows the comparison of the two methods :—

	0° C.	50° C.	100° C.	150° C.	200° C.
By equation $s = \frac{r}{AT} \cdot \frac{dt}{dp} + \sigma$ . .	211.5	12.11	1.660	0.3875	0.1277
From equation $V = 25.62 + \frac{49153}{P + 0.72}$,	54.97	11.43	1.643	0.3706	0.1343

Steam Entropy. — From the second law of thermo-dynamics may be deduced the equation

$$d\phi = \frac{dQ}{T},$$

in which ϕ is the entropy, dQ is the heat applied or withdrawn, and T is the absolute temperature. Since the entropy depends on the state of the substance only, and not on the method of arriving at that state, we may calculate the increase of entropy in one unit of weight of a given mixture of water and steam, above the entropy at ...

freezing point to the temperature t, and that the portion x is then changed into steam. During the first operation the change of entropy will be

$$\theta = \int_0^t \frac{dq}{T} = \int_0^t \frac{cdt}{T}.$$

During the second operation the change of entropy will be

$$\frac{xr}{T},$$

since the heat is added at the constant temperature t. The entire change of entropy will be

$$\phi = \frac{xr}{T} + \int_0^t \frac{cdt}{T} = \frac{xr}{T} + \theta.$$

At any other state the entropy of a unit of weight of a mixture of steam and water will be

$$\phi_1 = \frac{x_1 r_1}{T_1} + \theta_1,$$

and the change of entropy will be

$$\phi - \phi_1 = \frac{xr}{T} + \theta - \frac{x_1 r_1}{T_1} - \theta_1.$$

During an adiabatic change no heat is transmitted, and the entropy is constant.

$$\frac{xr}{T} + \theta = \frac{x_1 r_1}{T_1} + \theta_1.$$

When the initial state including the value of x is known, and also the final temperature or pressure, the final value of x_1 may be calculated by the above equation; and the initial and final volumes may be found by the equations

$$v = xu + \sigma, \qquad v_1 = x_1 u_1 + \sigma;$$

the value of u for a given temperature or pressure, from the equation,

$$s = u + \sigma.$$

Entropy of the Liquid.—When the specific heat of a liquid is known in terms of the temperature, the entropy of the liquid,

$$\theta = \int_0^t \frac{cdt}{T},$$

is readily calculated. For water we have, for example, the entropy of the liquid at 13° C.

$$1.0072 \log_e \frac{T_5}{T_0} + 1.0044 \log_e \frac{T_{10}}{T_5} + 1.0016 \log_e \frac{T_{13}}{T_{10}}.$$

For other liquids having the general formula for the heat of the liquid,

$$q = at + bt^2 + ct^3,$$

Other Vapors. — Tables IV to IX are taken from Zeuner's *Mechanischen Wärmetheorie.* His values for the specific volume and density were calculated with 273 for the absolute temperature of 0° C., and with 424 for the mechanical equivalent of heat. To bring these tables into accord with Tables I, II, and III, the values of the specific volume and density have been modified by using 273.7 for the absolute temperature of 0° C., and 426.7 for the mechanical equivalent of heat at Paris.

The equations by which the tables were calculated, taken from Regnault's memoirs, *Académie des Sciences, Comptes rendus, Tome XXXVI*, are here assembled, together with Zeuner's equations for the differential co-efficient, $\frac{1}{p}\frac{dp}{dt}$.

TEMPERATURE AND PRESSURE.

1	log p 2	a 3	b 4	c 5
Alcohol	$a - b\alpha^n + c\beta^n$	5.4562028	4.9809960	0.0485397
Ether	$a + b\alpha^n - c\beta^n$	5.0280208	0.0002284	3.1906390
Chloroform	$a - b\alpha^n - c\beta^n$	5.2253893	2.9531281	0.0668673
Carbon bisulphide .	$a - b\alpha^n - c\beta^n$	5.4011002	3.4405663	0.2857386
Carbon tetrachloride .	$a - b\alpha^n - c\beta^n$	12.0962331	9.1375180	1.9674890

TEMPERATURE AND PRESSURE — *Concluded.*

	log α. 6	log β. 7	n 8	Limits. 9
Alcohol	$\bar{1}.99708557$	1.9409485	t + 20	−20°, +150° C.
Ether	0.0145775	1.9986877	t + 20	−20°, +120°
Chloroform	$\bar{1}.9974144$	1.9868176	t − 20	+20°, +164°
Carbon bisulphide .	$\bar{1}.9977628$	1.9911997	t + 20	−20°, +140°
Carbon tetrachloride .	$\bar{1}.9997120$	$\bar{1}.9940780$	t + 20	−20°, +188°

The equation for the temperature and pressure of the saturated vapor of aceton, as recalculated by Zeuner, is, —

$$\log p = a - b\alpha^n + c\beta^n.$$

$$a = 5.3085419$$

$$\frac{1}{p}\frac{dp}{dt} = A\alpha^n + B\beta^n$$

From Zeuner's *Wärmetheorie.*

	Sign.		Log ($A\alpha^n$)	Log ($B\beta^n$)
	$A\alpha^n$	$B\beta^n$		
Alcohol	+	−	$-1.1720041-0.0029143t$	$-2.9992701-0.0590515t$
Ether	+	+	$-1.3396624-0.0031223t$	$-4.4616396+0.0145775t$
Chloroform . . .	+	+	$-1.3410130-0.0025856t$	$-2.0667124-0.0131824t$
Carbon bisulphide .	+	+	$-1.4339778-0.0022372t$	$-2.0511078-0.0088003t$
Carbon tetrachloride,	+	+	$-1.8611078-0.0002880t$	$-1.3812195-0.0050220t$
Aceton	+	+	$-1.3268535-0.0026148t$	$-1.9064582-0.0215592t$
			t, temperature C.	

HEAT OF THE LIQUID.

Alcohol	$q = 0.54754t + 0.0011218t^2 + 0.000002206t^3$
Ether . . .	$q = 0.52901t + 0.0002959t^2$
Chloroform . .	$q = 0.23235t + 0.0000507t^2$
Carbon bisulphide .	$q = 0.23523t + 0.0000815t^2$
Carbon tetrachloride .	$q = 0.19798t + 0.0000906t^2$
Aceton . . .	$q = 0.50643t + 0.0003965t^2$

TOTAL HEAT.

Ether . . .	$\lambda = 94 + 0.45t - 0.0005556t^2$
Chloroform . .	$\lambda = 67 + 0.1375t$
Carbon bisulphide .	$\lambda = 90 + 0.14601t - 0.0004123t^2$
Carbon tetrachloride .	$\lambda = 52 + 0.14625t - 0.000172t^2$
Aceton . . .	$\lambda = 140.5 + 0.36644t - 0.000516t^2$

The total heat of alcohol varies in so irregular a manner that no equation can be given for it.

Zeuner gives the following empirical equations for calculating the heat equivalent of the internal work, which are proposed to lessen the labor of calculation

HEAT EQUIVALENT OF INTERNAL WORK.

Water . . .	$\rho = 575.40 - 0.791t$
Ether . . .	$\rho = 86.54 - 0.10648t - 0.0007160t^2$
Chloroform . .	$\rho = 62.44 - 0.11282t - 0.0000140t^2$
Carbon bisulphide .	$\rho = 82.79 - 0.11446t - 0.0004020t^2$
Carbon tetrachloride .	$\rho = 48.57 - 0.06844t - 0.0002080t^2$
Aceton . . .	$\rho = 131.63 - 0.20184t - 0.0006280t^2$

Sulphur Dioxide and Ammonia.—The use of ice-machines has brought into prominence liquids which vaporize at low temperatures. For two such

SULPHUR DIOXIDE.	AMMONIA.
$\log p = a - b\alpha^n - c\beta^n$	$\log p = a - b\alpha^n - c\beta^n$
$a = 5.6663790$	$a = 11.5043330$
$b = 3.0146890$	$b = 7.4503520$
$c = 0.1465400$	$c = 0.9499674$
$\log \alpha = \bar{1}.9972989$	$\log \alpha = \bar{1}.9996014$
$\log \beta = \bar{1}.9872900$	$\log \beta = \bar{1}.9939729$
$n = t + 28$	$n = t + 22$
Limits, -28, $+62$.	Limits, -22, $+82$.

Unfortunately the heat of the liquid and the total heat for these substances have not been determined. We have, however, some of the properties of these substances in the gaseous state or more properly in the state of superheated vapors.

Now, it has been shown by Zeuner that superheated steam may have its properties represented by the equation

$$pv = BT - Cp^a,$$

in which p is the pressure in pounds on the square foot or kilograms on the square meter, v is the volume of a pound in cubic feet or of a kilogram in cubic meters, and T is the absolute temperature. The constants have the following values when calculated from the properties of saturated steam:

French units, ...	$B = 51.3$	$C = 198$	$a = \frac{1}{4}$.
English units, ...	$B = 93.5$	$C = 971$	$a = \frac{1}{4}$.

It was first proposed by Ledoux to find similar equations to represent the properties of superheated sulphur dioxide and ammonia, and to use such equations for calculating approximate tables of the properties of these vapors when saturated, just as the tables of the properties of saturated steam had been used in establishing the equation for superheated steam.

In the *Thermodynamics of the Steam-engine* by the author, pages 452 to 459, this calculation has been carried out with the best ascertained properties of the superheated vapors of sulphor dioxide and ammonia with the following results:

	SULPHUR DIOXIDE.	AMMONIA.
French units,	$pv = 14.5\ T - 48p^{0.23}$	$pv = 54.3\ T - 142p^{\frac{1}{4}}$
English units,	$pv = 26.4\ T - 184p^{0.22}$	$pv = 99\ T - 540p^{\frac{1}{4}}$

The application of these equations to the vapors when saturated gives

HEAT OF VAPORIZATION.

	SULPHUR DIOXIDE.	AMMONIA.
French units,	$r = 98 - 0.27t$	$r = 300 - 0.8t.$
English units,	$r = 176 - 0.27(t - 32)$	$r = 540 - 0.8(t - 32).$

SPECIFIC HEAT OF THE LIQUID.

SULPHUR DIOXIDE.	AMMONIA.
$c = 0.4$	$c = 1.1$

Tables X and XI were calculated by aid of the equations written, and may be of use for approximate calculations, in default of more reliable tables.

Specific Volume of Liquids. — Table XII was taken from the *Phys.-Chem. Tabellen* of Landolt and Börnstein.

Volume of Water. — Table XIII gives the volumes of water compared with its volume at 4°. From 0° to 100° C., the values are those given by Rossetti. Above 100°, the values are those calculated by the equations given by Hirn in the *Annales de Chimie et de Physique, 1867.*

Volumes of Liquids. — The volumes of liquids at high temperatures, compared with the volume at freezing point, are represented by the following equations given by Hirn in the *Annales:* —

		Logs.
Water 100° C. to 200° C. (vol. at 4° C. = unity)	$v = 1 + 0.00010867875t$	6.0361445−10
	$+0.0000030073653t^2$	4.4781862−10
	$+0.0000000028730422t^3$	1.4583419−10
	$-0.0000000000066457031t^4$	8.8225409−20
Alcohol 30° C. to 160° C. (vol. at 0° C. = unity)	$v = 1 + 0.00073892265t$	6.8685991−10
	$+0.000001055235t^2$	3.0233492−10
	$-0.0000000092480842t^3$	2.9660517−10
	$+0.000000000040413567t^4$	0.6065278−10
Ether 30° C. to 130° C. (vol. at 0° C. = unity)	$v = 1 + 0.0013489059t$	7.1299817−10
	$+0.0000065537t^2$	4.8164866−10
	$-0.000000034490756t^3$	2.5377028−10
	$+0.00000000033772062t^4$	0.5285571−10
Carbon bisulphide 30° to 100° C. (vol. at 0° C. = unity)	$v = 1 + 0.0011680559t$	7.0074636−10
	$+0.0000016489598t^2$	4.2172103−10
	$-0.00000000081119062t^3$	0.9091229−10
	$+0.0000000000060946589t^4$	.7849494−20
Carbon tetrachloride 30° to 100° C. (vol. at 0° C. = unity)	$v = 1 + 0.0010671883t$	7.0282409−10
	$+0.0000035651378t^2$	4.5520763−10
	$-0.000000014949281t^3$	2.1746202−10
	$+0.000000000085182318t^4$	9.9303494−20

Other Data. — For convenience the following data are assembled: —

Length of the metre in inches	39.3702 (Rogers) 39.370432 (Clarke)
Weight of the kilogramme in pounds . . .	2.20462125
Weight of 1 litre (1 cu. decimetre) of mercury .	13.5959 kilos.
One horse power, in foot pounds per second .	550
Cheval à vapeur, in kilogrammetres per second .	75
Normal pressure of the atmosphere . . .	760 mm. of mercury. 10,333 kilos per sq. m. 14.6967 lbs. per sq. in. 2116.32 lbs. per. sq. ft.
Absolute temperature of freezing point . .	273.°7 C. 492.°7 F.

Explanation of the Tables. — In Table I, the first column gives the temperature, t, of saturated steam.

The second column gives the corresponding pressure, p, in pounds on the square inch, above an absolute vacuum; the differences are placed between the two numbers from which they are derived. For example, the pressure at 40° F. is 0.1216 pounds per square inch; and the difference to be used in interpolation, and placed half a line lower, is 48.

The third column gives the heat of the liquid, q, required to raise the temperature of one pound of water from 32° F. to a given temperature.

The fourth column gives the total heat, λ, required to raise one pound of water from 32° F. to a given temperature, and to entirely vaporize it under the pressure due to that temperature.

The fifth column gives the heat of vaporization, or the heat required to vaporize one pound of water at a given temperature, under the pressure corresponding.

The sixth column gives the heat required to do the disgregation work during the vaporization of one pound of water.

The seventh column gives the heat required to overcome the external pressure, and do the work of increasing the volume from σ to s.

The eighth column gives the entropy of the liquid.

The ninth and tenth columns give the specific volume, or volume in cubic feet, of one pound of saturated steam, and the density or weight of one cubic foot in pounds.

Table II differs from Table I in that it is arranged to give the properties of saturated steam for each pound of pressure.

Table III gives the properties of saturated steam in French units; and Tables IV to XI give the properties of other saturated vapors in the same

TABLE I.

SATURATED STEAM.

ENGLISH UNITS.

Temperature, Degrees Fahr. t	Pressure, Pounds per Square Inch. p		Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int\frac{c\,dt}{T}$	Specific Volume. s		Density. Weight, in Pounds, of one Cubic Foot. γ		Temperature, Degrees Fahr. t
32	0.0890	36	0	1091.7	1091.7	1035.9	55.8	0.0000	3387	127	0.0002952	115	32
33	0.0926	37	1.01	1092.0	1091.0	1035.1	55.9	0.0020	3260	122	0.0003067	120	33
34	0.0963	39	2.01	1092.3	1090.3	1034.3	56.0	0.0041	3138	116	0.0003187	122	34
35	0.1002	40	3.02	1092.6	1089.6	1033.6	56.0	0.0061	3022	112	0.0003309	127	35
36	0.1042	41	4.03	1092.9	1088.9	1032.8	56.1	0.0081	2910	107	0.0003436	132	36
37	0.1083	43	5.04	1093.2	1088.2	1032.0	56.2	0.0101	2803	103	0.0003568	136	37
38	0.1126	44	6.04	1093.5	1087.5	1031.3	56.2	0.0122	2700	99	0.0003704	141	38
39	0.1170	46	7.05	1093.8	1086.7	1030.4	56.3	0.0142	2601	95	0.0003845	145	39
40	0.1216	48	8.06	1094.1	1086.0	1029.6	56.4	0.0162	2506	91	0.0003990	151	40
41	0.1264	49	9.06	1094.4	1085.3	1028.8	56.5	0.0182	2415	87	0.0004141	155	41
42	0.1313	51	10.07	1094.8	1084.7	1028.1	56.6	0.0202	2328	84	0.0004296	160	42
43	0.1364	53	11.07	1095.1	1084.0	1027.3	56.7	0.0222	2244	80	0.0004456	165	43
44	0.1417	54	12.08	1095.4	1083.3	1026.5	56.8	0.0242	2164	77	0.0004621	171	44
45	0.1471	57	13.08	1095.7	1082.6	1025.8	56.8	0.0262	2087	74	0.0004792	176	45
46	0.1528	58	14.09	1096.0	1081.9	1025.0	56.9	0.0282	2013	71	0.0004968	181	46
47	0.1586	60	15.09	1096.3	1081.2	1024.2	57.0	0.0302	1942	68	0.0005149	187	47
48	0.1646	62	16.10	1096.6	1080.5	1023.4	57.1	0.0322	1874	66	0.0005336	194	48
49	0.1708	65	17.10	1096.9	1079.8	1022.6	57.2	0.0341	1808	63	0.0005530	201	49
50	0.1773	66	18.10	1097.2	1079.1	1021.8	57.3	0.0361	1745	60	0.0005731	206	50
51	0.1839	69	19.11	1097.5	1078.4	1021.1	57.3	0.0381	1685	59	0.0005937	213	51
52	0.1908	71	20.11	1097.8	1077.7	1020.3	57.4	0.0400	1626	56	0.0006150	219	52
53	0.1979	73	21.11	1098.1	1077.0	1019.5	57.5	0.0420	1570	54	0.0006369	226	53
54	0.2052	76	22.11	1098.4	1076.3	1018.7	57.6	0.0439	1516	51	0.0006595	234	54
55	0.2128	78	23.11	1098.7	1075.6	1017.9	57.7	0.0459	1465	50	0.0006829	240	55
56	0.2206	81	24.11	1099.0	1074.9	1017.1	57.8	0.0478	1415	48	0.0007069	248	56
57	0.2287	83	25.12	1099.3	1074.2	1016.3	57.9	0.0497	1367	46	0.0007317	254	57
58	0.2370	86	26.12	1099.6	1073.5	1015.6	57.9	0.0517	1321	45	0.0007571	263	58
59	0.2456	89	27.12	1099.9	1072.8	1014.8	58.0	0.0536	1276	42	0.0007834	270	59
60	0.2545	92	28.12	1100.2	1072.1	1014.0	58.1	0.0555	1234	41	0.0008104	280	60
61	0.2637		29.12	1100.5	1071.4	1013.2	58.2	0.0574	1193		0.0008384		61

Temperature, Degrees Fahr. t	Pressure, Pounds per Square Inch. p	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int\frac{cdt}{T}$	Specific Volume. s	Density. Weight in Pounds of one Cubic Foot. γ	Temperature, Degrees Fahr. t
64	0.2929_{104}	32.12	1101.5	1069.4	1010.9	58.5	0.0632	1078.3_{36}	0.0009273_{313}	64
65	0.3033_{107}	33.12	1101.8	1068.7	1010.1	58.6	0.0651	1042.[illegible]	0.0009586_{325}	65
66	0.3140_{110}	34.12	1102.1	1068.0	1009.4	58.6	0.0670	100[illegible]	0.0009911_{329}	66
67	0.3250_{114}	35.12	1102.4	1067.3	1008.6	58.7	0.0689	976.3_{316}	0.001024_{35}	67
68	0.3364_{117}	36.12	1102.7	1066.6	1007.8	58.8	0.0708	944.7_{304}	0.001059_{35}	68
69	0.3481_{121}	37.12	1103.0	1065.9	1007.0	58.9	0.0727	914.3_{293}	0.001094_{36}	69
70	0.3602_{124}	38.11	1103.3	1065.2	1006.2	59.0	0.0745	885.0_{283}	0.001130_{37}	70
71	0.3726_{128}	39.11	1103.6	1064.5	1005.4	59.1	0.0764	856.7_{272}	0.001167_{38}	71
72	0.3854_{132}	40.11	1103.9	1063.8	1004.6	59.2	0.0783	829.5_{263}	0.001205_{40}	72
73	0.3986_{136}	41.11	1104.2	1063.1	1003.8	59.3	0.0802	803.2_{253}	0.001245_{41}	73
74	0.4122_{140}	42.11	1104.5	1062.4	1003.0	59.4	0.0820	777.9_{244}	0.001286_{41}	74
75	0.4262_{144}	43.11	1104.8	1061.7	1002.3	59.4	0.0839	753.5_{236}	0.001327_{43}	75
76	0.4406_{149}	44.11	1105.1	1061.0	1001.5	59.5	0.0858	729.9_{228}	0.001370_{44}	76
77	0.4555_{153}	45.10	1105.4	1060.3	1000.7	59.6	0.0876	707.1_{219}	0.001414_{45}	77
78	0.4708_{157}	46.10	1105.7	1059.6	999.9	59.7	0.0895	685.2_{211}	0.001459_{46}	78
79	0.4865_{162}	47.09	1106.0	1058.9	999.1	59.8	0.0913	664.1_{203}	0.001505_{48}	79
80	0.5027_{167}	48.09	1106.3	1058.2	998.3	59.9	0.0932	643.8_{197}	0.001553_{49}	80
81	0.5194_{171}	49.08	1106.6	1057.5	997.5	60.0	0.0950	624.1_{191}	0.001602_{51}	81
82	0.5365_{177}	50.08	1107.0	1056.9	996.8	60.1	0.0968	605.0_{184}	0.001653_{52}	82
83	0.5542_{181}	51.07	1107.3	1056.2	996.0	60.2	0.0987	586.6_{178}	0.001705_{53}	83
84	0.5723_{187}	52.07	1107.6	1055.5	995.2	60.3	0.1005	568.8_{171}	0.001758_{55}	84
85	0.5910_{192}	53.06	1107.9	1054.8	994.4	60.4	0.1023	551.7_{165}	0.001813_{56}	85
86	0.6102_{197}	54.06	1108.2	1054.1	993.7	60.4	0.1041	535.2_{160}	0.001869_{57}	86
87	0.6299_{203}	55.05	1108.5	1053.4	992.9	60.5	0.1060	519.2_{155}	0.001926_{59}	87
88	0.6502_{209}	56.05	1108.8	1052.7	992.1	60.6	0.1078	503.7_{148}	0.001985_{60}	88
89	0.6711_{214}	57.04	1109.1	1052.1	991.4	60.7	0.1096	488.9_{143}	0.002045_{62}	89
90	0.6925_{221}	58.04	1109.4	1051.4	990.6	60.8	0.1114	474.6_{139}	0.002107_{64}	90
91	0.7146_{226}	59.03	1109.7	1050.7	989.8	60.9	0.1132	460.7_{136}	0.002171_{66}	91
92	0.7372_{233}	60.03	1110.0	1050.0	989.0	61.0	0.1150	447.1_{131}	0.002237_{67}	92
93	0.7605_{239}	61.03	1110.3	1049.3	988.2	61.1	0.1168	434.0_{125}	0.002304_{68}	93
94	0.7844_{246}	62.02	1110.6	1048.6	987.4	61.2	0.1186	421.5_{122}	0.002372_{71}	94
95	0.8090_{252}	63.02	1110.9	1047.9	986.6	61.3	0.1204	409.3_{118}	0.002443_{73}	95
96	0.8342_{259}	64.01	1111.2	1047.2	985.8	61.4	0.1222	397.5_{114}	0.002516_{74}	96
97	0.8601_{266}	65.01	1111.5	1046.5	985.0	61.5	0.1240	386.1_{110}	0.002590_{76}	97
98	0.8867_{273}	66.01	1111.8	1045.8	984.2	61.6	0.1258	375.1_{107}	0.002666_{78}	98
99	0.9140_{281}	67.01	1112.1	1045.1	983.4	61.7	0.1275	364.4_{104}	0.002744_{80}	99
100	0.9421	68.01	1112.4	1044.4	982.7	61.7	0.1293	354.0_{99}	0.002824_{82}	100

Temperature, Degrees Fahr. t	Pressure, Pounds per Square Inch. p	Heat of the Liquid q	Total Heat. λ	Heat of Vaporization r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int\frac{c\,dt}{T}$	Specific Volume s	DENSITY. Weight, in Pounds, of one Cubic Foot. γ	Temperature, Degrees Fahr. t
104	1.0619_{319}	72.0	1113.7	1041.7	979.6	62.1	0.1364	316.1_{88}	0.003163_{91}	**104**
105	1.0938_{328}	73.0	1114.0	1041.0	978.8	62.2	0.1382	307.3_{85}	0.003254_{93}	**105**
106	1.1266_{336}	74.0	1114.3	1040.3	978.0	62.3	0.1400	298.8_{82}	0.003347_{94}	**106**
107	1.1602_{345}	75.0	1114.6	1039.6	977.2	62.4	0.1417	290.6_{79}	0.003441_{96}	**107**
108	1.1947_{354}	76.0	1114.9	1038.9	976.4	62.5	0.1435	282.7_{77}	0.003537_{99}	**108**
109	1.2301_{362}	77.0	1115.2	1038.2	975.6	62.6	0.1452	275.0_{75}	0.003636_{102}	**109**
110	1.2663_{372}	78.0	1115.5	1037.5	974.8	62.7	0.1470	267.5_{72}	0.003738_{104}	**110**
111	1.3035_{381}	79.0	1115.8	1036.8	974.0	62.8	0.1487	260.3_{70}	0.003842_{106}	**111**
112	1.3416_{391}	80.0	1116.1	1036.1	973.2	62.9	0.1505	253.3_{68}	0.003948_{109}	**112**
113	1.3807_{400}	81.0	1116.4	1035.4	972.4	63.0	0.1522	246.5_{66}	0.004057_{111}	**113**
114	1.4207_{411}	82.0	1116.7	1034.7	971.6	63.1	0.1540	239.9_{64}	0.004168_{115}	**114**
115	1.4618_{421}	83.0	1117.0	1034.0	970.8	63.2	0.1558	233.5_{62}	0.004283_{116}	**115**
116	1.5039_{431}	84.0	1117.3	1033.3	970.0	63.3	0.1575	227.3_{60}	0.004399_{120}	**116**
117	1.5470_{442}	85.0	1117.6	1032.6	969.2	63.4	0.1592	221.3_{58}	0.004519_{121}	**117**
118	1.5912_{452}	86.0	1117.9	1031.9	968.4	63.5	0.1610	215.5_{56}	0.004640_{124}	**118**
119	1.6364_{464}	87.0	1118.2	1031.2	967.6	63.6	0.1627	209.9_{55}	0.004764_{128}	**119**
120	1.6828_{474}	88.1	1118.5	1030.4	966.7	63.7	0.1645	204.4_{53}	0.004892_{130}	**120**
121	1.7302_{487}	89.1	1118.8	1029.7	966.0	63.7	0.1662	199.1_{52}	0.005022_{134}	**121**
122	1.7789_{498}	90.1	1119.2	1029.1	965.3	63.8	0.1679	193.9_{50}	0.005156_{137}	**122**
123	1.8287_{510}	91.1	1119.5	1028.4	964.5	63.9	0.1697	188.9_{48}	0.005293_{139}	**123**
124	1.8797_{521}	92.1	1119.8	1027.7	963.7	64.0	0.1714	184.1_{47}	0.005432_{142}	**124**
125	1.9318_{534}	93.1	1120.1	1027.0	962.9	64.1	0.1731	179.4_{46}	0.005574_{146}	**125**
126	1.9852_{547}	94.1	1120.4	1026.3	962.1	64.2	0.1748	174.8_{44}	0.005720_{148}	**126**
127	2.0399_{560}	95.1	1120.7	1025.6	961.3	64.3	0.1765	170.4_{43}	0.005868_{152}	**127**
128	2.0959_{574}	96.1	1121.0	1024.9	960.5	64.4	0.1783	166.1_{42}	0.006020_{156}	**128**
129	2.1533_{586}	97.1	1121.3	1024.2	959.7	64.5	0.1800	161.9_{41}	0.006176_{160}	**129**
130	2.2119_{600}	98.1	1121.6	1023.5	958.9	64.6	0.1817	157.8_{39}	0.006336_{162}	**130**
131	2.2719_{614}	99.1	1121.9	1022.8	958.1	64.7	0.1834	153.9_{38}	0.006498_{166}	**131**
132	2.3333_{628}	100.2	1122.2	1022.0	957.2	64.8	0.1851	150.1_{37}	0.006664_{169}	**132**
133	2.3961_{642}	101.2	1122.5	1021.3	956.4	64.9	0.1868	146.4_{36}	0.006833_{172}	**133**
134	2.4603_{658}	102.2	1122.8	1020.6	955.6	65.0	0.1885	142.8_{36}	0.007005_{176}	**134**
135	2.5261_{671}	103.2	1123.1	1019.9	954.8	65.1	0.1902	139.2_{34}	0.007181_{180}	**135**
136	2.5932_{687}	104.2	1123.4	1019.2	954.0	65.2	0.1919	135.8_{33}	0.007361_{184}	**136**
137	2.6619_{702}	105.2	1123.7	1018.5	953.2	65.3	0.1936	132.5_{32}	0.007545_{187}	**137**
138	2.7321_{719}	106.2	1124.0	1017.8	952.4	65.4	0.1952	129.3_{31}	0.007732_{192}	**138**
139	2.8040_{734}	107.2	1124.3	1017.1	951.6	65.5	0.1969	126.2_{30}	0.007924_{196}	**139**
140	2.8774_{751}	108.2	1124.6	1016.4	950.8	65.6	0.1986	123.2_{30}	0.008120_{198}	**140**
141	2.9525	109.2	1124.9	1015.7	950.0	65.7	0.2003	120.2	0.008318_{204}	**141**

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144	3.1877_{819}	112.2	1125.9	1013.7	947.7	66.0	0.2053	111.8_{26}	0.008942_{217}	144
145	3.2696_{836}	113.3	1126.2	1012.9	946.8	66.1	0.2070	109.2_{26}	0.009159_{220}	145
146	3.3532_{855}	114.3	1126.5	1012.2	946.0	66.2	0.2086	106.6_{25}	0.009379_{225}	146
147	3.4387_{873}	115.3	1126.8	1011.5	945.2	66.3	0.2103	104.1_{24}	0.009604_{229}	147
148	3.5260_{892}	116.3	1127.1	1010.8	944.4	66.4	0.2119	101.7_{24}	0.009833_{237}	148
149	3.6152_{911}	117.3	1127.4	1010.1	943.6	66.5	0.2136	99.33_{230}	0.01007_{24}	149
150	3.7063_{930}	118.3	1127.7	1009.4	942.8	66.6	0.2152	97.03_{224}	0.01031_{24}	150
151	3.7993_{950}	119.3	1128.0	1008.7	942.0	66.7	0.2169	94.79_{218}	0.01055_{25}	151
152	3.8943_{970}	120.3	1128.3	1008.0	941.3	66.7	0.2185	92.61_{212}	0.01080_{25}	152
153	3.9913_{990}	121.3	1128.6	1007.3	940.5	66.8	0.2202	90.49_{206}	0.01105_{26}	153
154	4.0903_{1011}	122.3	1128.9	1006.6	939.7	66.9	0.2218	88.43_{201}	0.01131_{26}	154
155	4.1914_{1032}	123.3	1129.2	1005.9	938.9	67.0	0.2235	86.42_{195}	0.01157_{27}	155
156	4.2946_{1054}	124.3	1129.5	1005.2	938.1	67.1	0.2251	84.47_{191}	0.01184_{27}	156
157	4.4000_{1075}	125.4	1129.8	1004.4	937.2	67.2	0.2267	82.56_{186}	0.01211_{28}	157
158	4.5075_{1097}	126.4	1130.1	1003.7	936.4	67.3	0.2284	80.70_{180}	0.01239_{28}	158
159	4.6172_{1120}	127.4	1130.4	1003.0	935.6	67.4	0.2300	78.90_{176}	0.01267_{29}	159
160	4.7292_{1143}	128.4	1130.7	1002.3	934.8	67.5	0.2316	77.14_{171}	0.01296_{30}	160
161	4.8435_{1166}	129.4	1131.0	1001.6	934.0	67.6	0.2332	75.43_{166}	0.01326_{30}	161
162	4.9601_{1189}	130.4	1131.4	1001.0	933.3	67.7	0.2349	73.77_{163}	0.01356_{30}	162
163	5.079_{121}	131.4	1131.7	1000.3	932.5	67.8	0.2365	72.14_{158}	0.01386_{31}	163
164	5.200_{124}	132.4	1132.0	999.6	931.7	67.9	0.2381	70.56_{155}	0.01417_{32}	164
165	5.324_{126}	133.4	1132.3	998.9	930.9	68.0	0.2397	69.01_{150}	0.01449_{32}	165
166	5.450_{129}	134.4	1132.6	998.2	930.1	68.1	0.2413	67.51_{146}	0.01481_{33}	166
167	5.579_{131}	135.4	1132.9	997.5	929.3	68.2	0.2429	66.05_{143}	0.01514_{34}	167
168	5.710_{134}	136.4	1133.2	996.8	928.5	68.3	0.2445	64.62_{140}	0.01548_{34}	168
169	5.844_{137}	137.4	1133.5	996.1	927.7	68.4	0.2461	63.22_{137}	0.01582_{35}	169
170	5.981_{139}	138.5	1133.8	995.3	926.8	68.5	0.2477	61.85_{132}	0.01617_{35}	170
171	6.120_{142}	139.5	1134.1	994.6	926.0	68.6	0.2493	60.53_{128}	0.01652_{36}	171
172	6.262_{145}	140.5	1134.4	993.9	925.2	68.7	0.2509	59.25_{126}	0.01688_{36}	172
173	6.407_{147}	141.5	1134.7	993.2	924.4	68.8	0.2525	57.99_{123}	0.01724_{38}	173
174	6.554_{150}	142.5	1135.0	992.5	923.7	68.8	0.2541	56.76_{120}	0.01762_{38}	174
175	6.704_{154}	143.5	1135.3	991.8	922.9	68.9	0.2557	55.56_{116}	0.01800_{38}	175
176	6.858_{156}	144.5	1135.6	991.1	922.1	69.0	0.2573	54.40_{114}	0.01838_{40}	176
177	7.014_{159}	145.5	1135.9	990.4	921.3	69.1	0.2589	53.26_{112}	0.01878_{40}	177
178	7.173_{162}	146.5	1136.2	989.7	920.5	69.2	0.2604	52.14_{108}	0.01918_{40}	178
179	7.335_{165}	147.5	1136.5	989.0	919.7	69.3	0.2620	51.06_{105}	0.01958_{42}	179
180	7.500_{168}	148.5	1136.8	988.3	918.9	69.4	0.2636	50.01_{103}	0.02000_{42}	180

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184	8.192$_{181}$	152.6	1138.1	985.5	915.7	69.8	0.2699	46.03$_{94}$	0.02172$_{46}$	184
185	8.373$_{185}$	153.6	1138.4	984.8	914.9	69.9	0.2714	45.09$_{92}$	0.02218$_{46}$	185
186	8.558$_{188}$	154.6	1138.7	984.1	914.1	70.0	0.2730	44.17$_{89}$	0.02264$_{47}$	186
187	8.746$_{191}$	155.6	1139.0	983.4	913.4	70.0	0.2745	43.28$_{87}$	0.02311$_{47}$	187
188	8.937$_{195}$	156.6	1139.3	982.7	912.6	70.1	0.2761	42.41$_{85}$	0.02358$_{48}$	188
189	9.132$_{198}$	157.6	1139.6	982.0	911.8	70.2	0.2777	41.56$_{83}$	0.02406$_{49}$	189
190	9.330$_{202}$	158.6	1139.9	981.3	911.0	70.3	0.2792	40.73$_{81}$	0.02455$_{50}$	190
191	9.532$_{206}$	159.6	1140.2	980.6	910.2	70.4	0.2808	39.92$_{79}$	0.02505$_{51}$	191
192	9.738$_{209}$	160.6	1140.5	979.9	909.4	70.5	0.2823	39.13$_{78}$	0.02556$_{52}$	192
193	9.947$_{213}$	161.6	1140.8	979.2	908.6	70.6	0.2838	38.35$_{76}$	0.02608$_{52}$	193
194	10.160$_{217}$	162.6	1141.1	978.5	907.8	70.7	0.2854	37.59$_{74}$	0.02660$_{54}$	194
195	10.377$_{221}$	163.7	1141.4	977.7	906.9	70.8	0.2869	36.85$_{72}$	0.02714$_{54}$	195
196	10.598$_{224}$	164.7	1141.7	977.0	906.2	70.8	0.2885	36.13$_{71}$	0.02768$_{55}$	196
197	10.822$_{229}$	165.7	1142.0	976.3	905.4	70.9	0.2900	35.42$_{69}$	0.02823$_{56}$	197
198	11.051$_{232}$	166.7	1142.3	975.6	904.6	71.0	0.2915	34.73$_{67}$	0.02879$_{57}$	198
199	11.283$_{237}$	167.7	1142.6	974.9	903.8	71.1	0.2930	34.06$_{66}$	0.02936$_{58}$	199
200	11.520$_{241}$	168.7	1142.9	974.2	903.0	71.2	0.2946	33.40$_{64}$	0.02994$_{59}$	200
201	11.761$_{244}$	169.7	1143.2	973.5	902.2	71.3	0.2961	32.76$_{63}$	0.03053$_{59}$	201
202	12.005$_{249}$	170.7	1143.6	972.9	901.5	71.4	0.2976	32.13$_{61}$	0.03112$_{61}$	202
203	12.254$_{254}$	171.7	1143.9	972.2	900.8	71.4	0.2991	31.52$_{60}$	0.03173$_{62}$	203
204	12.508$_{257}$	172.7	1144.2	971.5	900.0	71.5	0.3007	30.92$_{59}$	0.03235$_{62}$	204
205	12.765$_{263}$	173.7	1144.5	970.8	899.2	71.6	0.3022	30.33$_{57}$	0.03297$_{66}$	205
206	13.028$_{266}$	174.7	1144.8	970.1	898.4	71.7	0.3037	29.76$_{57}$	0.03361$_{65}$	206
207	13.294$_{271}$	175.8	1145.1	969.3	897.5	71.8	0.3052	29.19$_{56}$	0.03426$_{67}$	207
208	13.565$_{276}$	176.8	1145.4	968.6	896.7	71.9	0.3067	28.63$_{54}$	0.03493$_{67}$	208
209	13.841$_{281}$	177.8	1145.7	967.9	896.0	71.9	0.3082	28.09$_{52}$	0.03560$_{68}$	209
210	14.122$_{285}$	178.8	1146.0	967.2	895.2	72.0	0.3097	27.57$_{52}$	0.03628$_{69}$	210
211	14.407$_{290}$	179.8	1146.3	966.5	894.4	72.1	0.3112	27.05$_{45}$	0.03697$_{63}$	211
212	14.697$_{293}$	180.8	1146.6	965.8	893.5	72.3	0.3127	26.60$_{44}$	0.03760$_{64}$	212
213	14.990$_{299}$	181.8	1146.9	965.1	892.6	72.5	0.3142	26.16$_{49}$	0.03824$_{72}$	213
214	15.289$_{303}$	182.8	1147.2	964.4	891.8	72.6	0.3157	25.67$_{48}$	0.03896$_{73}$	214
215	15.592$_{309}$	183.8	1147.5	963.7	891.0	72.7	0.3172	25.19$_{46}$	0.03969$_{74}$	215
216	15.901$_{313}$	184.8	1147.8	963.0	890.2	72.8	0.3187	24.73$_{45}$	0.04043$_{75}$	216
217	16.214$_{319}$	185.8	1148.1	962.3	889.5	72.8	0.3202	24.28$_{44}$	0.04118$_{76}$	217
218	16.533$_{324}$	186.8	1148.4	961.6	888.7	72.9	0.3217	23.84$_{43}$	0.04194$_{78}$	218
219	16.857$_{329}$	187.8	1148.7	960.9	887.9	73.0	0.3232	23.41$_{43}$	0.04272$_{80}$	219
220	17.186$_{335}$	188.9	1149.0	960.1	887.1	73.0	0.3246	22.98$_{42}$	0.04352$_{80}$	220
221	17.521$_{340}$	189.9	1149.3	959.4	886.3	73.1	0.3261	22.56$_{41}$	0.04432$_{82}$	221

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224	18.557_{357}	192.9	1150.3	957.4	884.0	73.4	0.3305	21.37_{38}	0.04679_{85}	**224**
225	18.914_{362}	193.9	1150.6	956.7	883.3	73.4	0.3320	20.99_{37}	0.04764_{86}	**225**
226	19.276_{368}	194.9	1150.9	956.0	882.5	73.5	0.3335	20.62_{37}	0.04850_{88}	**226**
227	19.644_{374}	195.9	1151.2	955.3	881.7	73.6	0.3349	20.25_{36}	0.04938_{90}	**227**
228	20.018_{379}	196.9	1151.5	954.6	880.9	73.7	0.3364	19.89_{35}	0.05028_{90}	**228**
229	20.397_{386}	197.9	1151.8	953.9	880.2	73.7	0.3379	19.54_{34}	0.05118_{90}	**229**
230	20.783_{392}	198.9	1152.1	953.2	879.4	73.8	0.3393	19.20_{33}	0.05208_{92}	**230**
231	21.175_{397}	199.9	1152.4	952.5	878.6	73.9	0.3408	18.87_{33}	0.05300_{94}	**231**
232	21.572_{404}	201.0	1152.7	951.7	877.8	73.9	0.3423	18.54_{32}	0.05394_{95}	**232**
233	21.976_{410}	202.0	1153.0	951.0	877.0	74.0	0.3437	18.22_{32}	0.05489_{97}	**233**
234	22.386_{417}	203.0	1153.3	950.3	876.2	74.1	0.3452	17.90_{31}	0.05586_{99}	**234**
235	22.803_{423}	204.0	1153.6	949.6	875.4	74.2	0.3466	17.59_{30}	0.05685_{99}	**235**
236	23.226_{429}	205.0	1153.9	948.9	874.6	74.3	0.3481	17.29_{30}	0.05784_{101}	**236**
237	23.655_{436}	206.0	1154.2	948.2	873.9	74.3	0.3495	16.99_{29}	0.05885_{102}	**237**
238	24.091_{442}	207.0	1154.5	947.5	873.1	74.4	0.3510	16.70_{28}	0.05987_{103}	**238**
239	24.533_{449}	208.0	1154.8	946.8	872.3	74.5	0.3524	16.42_{28}	0.06090_{105}	**239**
240	24.982_{456}	209.0	1155.1	946.1	871.6	74.5	0.3538	16.14_{27}	0.06195_{106}	**240**
241	25.438_{462}	210.0	1155.4	945.4	870.8	74.6	0.3553	15.87_{27}	0.06301_{108}	**241**
242	25.900_{470}	211.0	1155.8	944.8	870.1	74.7	0.3567	15.60_{26}	0.06409_{110}	**242**
243	26.370_{476}	212.0	1156.1	944.1	869.3	74.8	0.3581	15.34_{26}	0.06519_{111}	**243**
244	26.846_{484}	213.0	1156.4	943.4	868.5	74.9	0.3596	15.08_{25}	0.06630_{113}	**244**
245	27.330_{491}	214.1	1156.7	942.6	867.7	74.9	0.3610	14.83_{25}	0.06743_{115}	**245**
246	27.821_{498}	215.1	1157.0	941.9	866.9	75.0	0.3624	14.58_{24}	0.06858_{115}	**246**
247	28.319_{505}	216.1	1157.3	941.2	866.1	75.1	0.3639	14.34_{23}	0.06973_{116}	**247**
248	28.824_{512}	217.1	1157.6	940.5	865.3	75.2	0.3653	14.11_{23}	0.07089_{118}	**248**
249	29.336_{520}	218.1	1157.9	939.8	864.5	75.3	0.3667	13.88_{23}	0.07207_{120}	**249**
250	29.856_{528}	219.1	1158.2	939.1	863.8	75.3	0.3681	13.65_{22}	0.07327_{121}	**250**
251	30.384_{535}	220.1	1158.5	938.4	863.0	75.4	0.3695	13.43_{22}	0.07448_{123}	**251**
252	30.919_{543}	221.1	1158.8	937.7	862.2	75.5	0.3709	13.21_{22}	0.07571_{126}	**252**
253	31.462_{550}	222.1	1159.1	937.0	861.4	75.6	0.3724	12.99_{21}	0.07697_{128}	**253**
254	32.012_{559}	223.1	1159.4	936.3	860.7	75.6	0.3738	12.78_{21}	0.07825_{128}	**254**
255	32.571_{566}	224.1	1159.7	935.6	859.9	75.7	0.3752	12.57_{20}	0.07953_{129}	**255**
256	33.137_{574}	225.1	1160.0	934.9	859.1	75.8	0.3766	12.37_{20}	0.08082_{132}	**256**
257	33.711_{583}	226.2	1160.3	934.1	858.2	75.9	0.3780	12.17_{19}	0.08214_{133}	**257**
258	34.294_{590}	227.2	1160.6	933.4	857.5	75.9	0.3794	11.98_{19}	0.08347_{135}	**258**
259	34.884_{599}	228.2	1160.9	932.7	856.7	76.0	0.3808	11.79_{19}	0.08482_{137}	**259**
260	35.483_{607}	229.2	1161.2	932.0	855.9	76.1	0.3822	11.60_{18}	0.08619_{138}	**260**
261	36.090_{616}	230.2	1161.5	931.3	855.1	76.2	0.3836	11.42_{18}	0.08757_{140}	**261**

Degrees Fahr	Pressure, Pounds p Square Inch.	Heat of the Liqui	Total Heat.	Heat of Vaporizatio	Heat equivalen of Internal Work.	Heat equivalen of External Work.	Entropy of the Liquid.	Specific Volum	DENSITY: Weight, in Pounds, of one Cubic Foot.	Temperature, Degrees Fahr
	p	q	λ	r	ρ	Apu	$\int\frac{cdt}{T}$	s	γ	t
54	37.963_{641}	233.2	1162.5	929.3	852.9	76.4	0.3878	10.89_{17}	0.09182_{145}	264
55	38.604_{651}	234.2	1162.8	928.6	852.1	76.5	0.3891	10.72_{17}	0.09327_{147}	265
56	39.255_{659}	235.2	1163.1	927.9	851.3	76.6	0.3906	10.55_{16}	0.09474_{150}	266
57	39.914_{668}	236.2	1163.4	927.2	850.6	76.6	0.3919	10.39_{16}	0.09624_{151}	267
58	40.582_{677}	237.2	1163.7	926.5	849.8	76.7	0.3933	10.23_{16}	0.09775_{152}	268
59	41.259_{686}	238.2	1164.0	925.8	849.0	76.8	0.3947	10.07_{15}	0.09927_{153}	269
70	41.945_{695}	239.3	1164.3	925.0	848.1	76.9	0.3961	9.918_{152}	0.1008_{16}	270
71	42.640_{705}	240.3	1164.6	924.3	847.4	76.9	0.3975	9.766_{149}	0.1024_{16}	271
72	43.345_{714}	241.3	1164.9	923.6	846.6	77.0	0.3988	9.617_{146}	0.1040_{16}	272
73	44.059_{723}	242.3	1165.2	922.9	845.8	77.1	0.4002	9.471_{143}	0.1056_{16}	273
74	44.782_{733}	243.3	1165.5	922.2	845.0	77.2	0.4016	9.328_{141}	0.1072_{16}	274
75	45.515_{743}	244.3	1165.8	921.5	844.2	77.3	0.4030	9.187_{138}	0.1088_{17}	275
76	46.258_{753}	245.3	1166.1	920.8	843.5	77.3	0.4043	9.049_{136}	0.1105_{17}	276
77	47.011_{762}	246.3	1166.4	920.1	842.7	77.4	0.4057	8.913_{133}	0.1122_{17}	277
78	47.773_{772}	247.3	1166.7	919.4	841.9	77.5	0.4071	8.780_{131}	0.1139_{17}	278
79	48.545_{783}	248.3	1167.0	918.7	841.1	77.6	0.4084	8.649_{128}	0.1156_{17}	279
80	49.328_{792}	249.3	1167.3	918.0	840.4	77.6	0.4098	8.521_{126}	0.1173_{18}	280
81	50.12_{80}	250.3	1167.6	917.3	839.6	77.7	0.4112	8.395_{124}	0.1191_{18}	281
82	50.92_{82}	251.4	1168.0	916.6	838.8	77.8	0.4125	8.271_{122}	0.1209_{18}	282
83	51.74_{82}	252.4	1168.3	915.9	838.0	77.9	0.4139	8.149_{119}	0.1227_{18}	283
84	52.56_{83}	253.4	1168.6	915.2	837.2	78.0	0.4152	8.030_{117}	0.1245_{19}	284
85	53.39_{85}	254.4	1168.9	914.5	836.5	78.0	0.4166	7.913_{116}	0.1264_{19}	285
86	54.24_{85}	255.4	1169.2	913.8	835.7	78.1	0.4179	7.797_{113}	0.1283_{19}	286
87	55.09_{87}	256.4	1169.5	913.1	834.9	78.2	0.4193	7.684_{111}	0.1302_{19}	287
88	55.96_{87}	257.4	1169.8	912.4	834.1	78.3	0.4206	7.573_{109}	0.1321_{19}	288
89	56.83_{89}	258.4	1170.1	911.7	833.4	78.3	0.4220	7.464_{108}	0.1340_{19}	289
90	57.72_{90}	259.4	1170.4	911.0	832.6	78.4	0.4233	7.356_{105}	0.1359_{20}	290
91	58.62_{91}	260.4	1170.7	910.3	831.8	78.5	0.4247	7.251_{103}	0.1379_{20}	291
92	59.53_{92}	261.4	1171.0	909.6	831.0	78.6	0.4260	7.148_{102}	0.1399_{20}	292
93	60.45_{93}	262.4	1171.3	908.9	830.3	78.6	0.4273	7.046_{100}	0.1419_{21}	293
94	61.38_{95}	263.4	1171.6	908.2	829.5	78.7	0.4287	6.946_{99}	0.1440_{21}	294
95	62.33_{95}	264.5	1171.9	907.4	828.6	78.8	0.4300	6.847_{97}	0.1461_{21}	295
96	63.28_{97}	265.5	1172.2	906.7	827.8	78.9	0.4313	6.750_{95}	0.1482_{21}	296
97	64.25_{98}	266.5	1172.5	906.0	827.0	79.0	0.4327	6.655_{93}	0.1503_{21}	297
98	65.23_{99}	267.5	1172.8	905.3	826.3	79.0	0.4340	6.562_{92}	0.1524_{21}	298
99	66.22_{100}	268.5	1173.1	904.6	825.5	79.1	0.4353	6.470_{90}	0.1545_{22}	299
00	67.22_{102}	269.5	1173.4	903.9	824.7	79.2	0.4366	6.380_{88}	0.1567_{22}	300
01	68.24	270.5	1173.7	903.2	823.9	79.3	0.4380	6.292_{87}	0.1589_{22}	301

Temperature, Degrees Fahr. t	Pressure, Pounds per Square Inch. p	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int \frac{cdt}{T}$	Specific Volume. s	Density. Weight, in Pounds, of one Cubic Foot. γ	Temperature, Degrees Fahr. t
304	71.36_{106}	273.5	1174.7	901.2	821.7	79.5	0.4419	6.035_{83}	0.1657_{23}	304
305	72.42_{108}	274.5	1175.0	900.5	820.9	79.6	0.4433	5.952_{81}	0.1680_{23}	305
306	73.50_{109}	275.5	1175.3	899.8	820.1	79.7	0.4446	5.871_{80}	0.1703_{24}	306
307	74.59_{110}	276.6	1175.6	899.0	819.3	79.7	0.4459	5.791_{79}	0.1727_{24}	307
308	75.69_{111}	277.6	1175.9	898.3	818.5	79.8	0.4472	5.712_{78}	0.1751_{24}	308
309	76.80_{113}	278.6	1176.2	897.6	817.7	79.9	0.4485	5.634_{76}	0.1775_{24}	309
310	77.93_{114}	279.6	1176.5	896.9	817.0	79.9	0.4498	5.558_{74}	0.1799_{24}	310
311	79.07_{116}	280.6	1176.8	896.2	816.2	80.0	0.4511	5.484_{74}	0.1823_{25}	311
312	80.23_{116}	281.6	1177.1	895.5	815.4	80.1	0.4524	5.410_{73}	0.1848_{25}	312
313	81.39_{118}	282.7	1177.4	894.7	814.5	80.2	0.4538	5.337_{71}	0.1873_{26}	313
314	82.57_{120}	283.7	1177.7	894.0	813.8	80.2	0.4552	5.266_{71}	0.1899_{26}	314
315	83.77_{121}	284.8	1178.0	893.2	812.9	80.3	0.4565	5.195_{69}	0.1925_{26}	315
316	84.98_{122}	285.8	1178.3	892.5	812.1	80.4	0.4579	5.126_{68}	0.1951_{26}	316
317	86.20_{123}	286.9	1178.6	891.7	811.3	80.4	0.4592	5.058_{67}	0.1977_{27}	317
318	87.43_{125}	287.9	1178.9	891.0	810.5	80.5	0.4606	4.991_{66}	0.2004_{27}	318
319	88.68_{127}	289.0	1179.2	890.2	809.6	80.6	0.4619	4.925_{64}	0.2031_{27}	319
320	89.95_{128}	290.0	1179.5	889.5	808.8	80.7	0.4633	4.861_{64}	0.2058_{27}	320
321	91.23_{129}	291.0	1179.8	888.8	808.1	80.7	0.4646	4.797_{62}	0.2085_{27}	321
322	92.52_{130}	292.1	1180.2	888.1	807.3	80.8	0.4659	4.735_{62}	0.2112_{28}	322
323	93.82_{132}	293.1	1180.5	887.4	806.5	80.9	0.4672	4.673_{61}	0.2140_{28}	323
324	95.14_{134}	294.2	1180.8	886.6	805.7	80.9	0.4686	4.612_{60}	0.2168_{29}	324
325	96.48_{135}	295.2	1181.1	885.9	804.9	81.0	0.4699	4.552_{59}	0.2197_{29}	325
326	97.83_{137}	296.3	1181.4	885.1	804.1	81.1	0.4713	4.493_{57}	0.2226_{29}	326
327	99.20_{138}	297.3	1181.7	884.4	803.3	81.1	0.4726	4.436_{57}	0.2255_{29}	327
328	100.58_{139}	298.4	1182.0	883.6	802.4	81.2	0.4739	4.379_{56}	0.2284_{29}	328
329	101.97_{141}	299.4	1182.3	882.9	801.6	81.3	0.4752	4.323_{56}	0.2313_{30}	329
330	103.38_{143}	300.5	1182.6	882.1	800.8	81.3	0.4766	4.267_{54}	0.2343_{31}	330
331	104.81_{144}	301.5	1182.9	881.4	800.0	81.4	0.4779	4.213_{54}	0.2374_{30}	331
332	106.25_{145}	302.6	1183.2	880.6	799.1	81.5	0.4792	4.159_{52}	0.2404_{31}	332
333	107.70_{147}	303.6	1183.5	879.9	798.4	81.5	0.4805	4.107_{52}	0.2435_{31}	333
334	109.17_{149}	304.6	1183.8	879.2	797.6	81.6	0.4818	4.055_{51}	0.2466_{32}	334
335	110.66_{151}	305.7	1184.1	878.4	796.7	81.7	0.4832	4.004_{50}	0.2498_{31}	335
336	112.17_{152}	306.7	1184.4	877.7	796.0	81.7	0.4845	3.954_{50}	0.2529_{32}	336
337	113.69_{153}	307.8	1184.7	876.9	795.1	81.8	0.4858	3.904_{49}	0.2561_{33}	337
338	115.22_{155}	308.8	1185.0	876.2	794.3	81.9	0.4871	3.855_{48}	0.2594_{33}	338
339	116.77_{157}	309.9	1185.3	875.4	793.5	81.9	0.4884	3.807_{47}	0.2627_{33}	339
340	118.34_{159}	310.9	1185.6	874.7	792.7	82.0	0.4897	3.760_{47}	0.2660_{33}	340
341	119.93_{160}	312.0	1185.9	873.9	791.8	82.1	0.4910	3.713_{45}	0.2693_{33}	341

Temperature, Degrees Fahr.	Pressure, Pounds per Square Inch.	Heat of the Liquid.	Total Heat.	Heat of Vaporization.	Heat equivalent of Internal Work.	Heat equivalent of External Work.	Entropy of the Liquid.	Specific Volume.	DENSITY. Weight, in Pounds, of one Cubic Foot.	Temperature, Degrees Fahr.
t	p	q	λ	r	ρ	Apu	$\int\frac{cdt}{T}$	s	γ	t
344	124.78 $_{165}$	315.1	1186.9	871.8	789.5	82.3	0.4949	3.578 $_{44}$	0.2795 $_{35}$	344
345	126.43 $_{167}$	316.1	1187.2	871.1	788.8	82.3	0.4962	3.534 $_{43}$	0.2830 $_{35}$	345
346	128.10 $_{169}$	317.2	1187.5	870.3	787.9	82.4	0.4975	3.491 $_{42}$	0.2865 $_{35}$	346
347	129.79 $_{170}$	318.2	1187.8	869.6	787.1	82.5	0.4988	3.449 $_{42}$	0.2900 $_{35}$	347
348	131.49 $_{172}$	319.3	1188.1	868.8	786.3	82.5	0.5001	3.407 $_{42}$	0.2935 $_{36}$	348
349	133.21 $_{174}$	320.3	1188.4	868.1	785.5	82.6	0.5014	3.365 $_{41}$	0.2971 $_{37}$	349
350	134.95 $_{176}$	321.4	1188.7	867.3	784.7	82.6	0.5027	3.324 $_{40}$	0.3008 $_{37}$	350
351	136.71 $_{177}$	322.4	1189.0	866.6	783.9	82.7	0.5040	3.284 $_{39}$	0.3045 $_{37}$	351
352	138.48 $_{179}$	323.5	1189.3	865.8	783.0	82.8	0.5053	3.245 $_{39}$	0.3082 $_{37}$	352
353	140.27 $_{181}$	324.5	1189.6	865.1	782.3	82.8	0.5066	3.206 $_{38}$	0.3119 $_{38}$	353
354	142.08 $_{183}$	325.6	1189.9	864.3	781.4	82.9	0.5078	3.168 $_{38}$	0.3157 $_{38}$	354
355	143.91 $_{184}$	326.6	1190.2	863.6	780.7	82.9	0.5091	3.130 $_{38}$	0.3195 $_{39}$	355
356	145.75 $_{187}$	327.7	1190.5	862.8	779.8	83.0	0.5104	3.092 $_{36}$	0.3234 $_{38}$	356
357	147.62 $_{188}$	328.7	1190.8	862.1	779.0	83.1	0.5117	3.056 $_{36}$	0.3272 $_{39}$	357
358	149.50 $_{190}$	329.7	1191.1	861.4	778.3	83.1	0.5130	3.020 $_{36}$	0.3311 $_{40}$	358
359	151.40 $_{193}$	330.8	1191.4	860.6	777.4	83.2	0.5142	2.984 $_{35}$	0.3351 $_{40}$	359
360	153.33 $_{194}$	331.8	1191.7	859.9	776.7	83.2	0.5155	2.949 $_{35}$	0.3391 $_{40}$	360
361	155.27 $_{195}$	332.9	1192.0	859.1	775.8	83.3	0.5168	2.914 $_{34}$	0.3431 $_{41}$	361
362	157.22 $_{198}$	333.9	1192.4	858.5	775.2	83.3	0.5181	2.880 $_{34}$	0.3472 $_{41}$	362
363	159.20 $_{200}$	335.0	1192.7	857.7	774.3	83.4	0.5193	2.846 $_{33}$	0.3513 $_{42}$	363
364	161.20 $_{202}$	336.0	1193.0	857.0	773.5	83.5	0.5206	2.813 $_{33}$	0.3555 $_{42}$	364
365	163.22 $_{203}$	337.1	1193.3	856.2	772.7	83.5	0.5219	2.780 $_{32}$	0.3597 $_{42}$	365
366	165.25 $_{206}$	338.1	1193.6	855.5	771.9	83.6	0.5231	2.748 $_{32}$	0.3639 $_{43}$	366
367	167.31 $_{208}$	339.2	1193.9	854.7	771.1	83.6	0.5244	2.716 $_{31}$	0.3682 $_{43}$	367
368	169.39 $_{209}$	340.2	1194.2	854.0	770.4	83.6	0.5257	2.685 $_{31}$	0.3725 $_{43}$	368
369	171.48 $_{212}$	341.3	1194.5	853.2	769.5	83.7	0.5269	2.654 $_{31}$	0.3768 $_{44}$	369
370	173.60 $_{214}$	342.3	1194.8	852.5	768.7	83.8	0.5282	2.623 $_{30}$	0.3812 $_{44}$	370
371	175.74 $_{215}$	343.3	1195.1	851.8	768.0	83.8	0.5294	2.593 $_{30}$	0.3856 $_{45}$	371
372	177.89 $_{218}$	344.4	1195.4	851.0	767.1	83.9	0.5307	2.563 $_{29}$	0.3901 $_{45}$	372
373	180.07 $_{220}$	345.5	1195.7	850.2	766.3	83.9	0.5320	2.534 $_{29}$	0.3946 $_{46}$	373
374	182.27 $_{222}$	346.5	1196.0	849.5	765.5	84.0	0.5332	2.505 $_{29}$	0.3992 $_{46}$	374
375	184.49 $_{224}$	347.5	1196.3	848.8	764.8	84.0	0.5345	2.476 $_{28}$	0.4038 $_{46}$	375
376	186.73 $_{226}$	348.6	1196.6	848.0	763.9	84.1	0.5357	2.448 $_{28}$	0.4084 $_{47}$	376
377	188.99 $_{228}$	349.6	1196.9	847.3	763.2	84.1	0.5370	2.420 $_{27}$	0.4131 $_{47}$	377
378	191.27 $_{231}$	350.6	1197.2	846.6	762.4	84.2	0.5382	2.393 $_{27}$	0.4178 $_{49}$	378
379	193.58 $_{233}$	351.7	1197.5	845.8	761.6	84.2	0.5395	2.366 $_{28}$	0.4227 $_{49}$	379
380	195.91 $_{234}$	352.8	1197.8	845.0	760.8	84.2	0.5407	2.338 $_{25}$	0.4276 $_{47}$	380
381	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	381

Temperature, Degrees Fahr t	Pressure, Pounds pe Square Inch. p	Heat of the Liquid q	Total Heat. λ	Heat of Vaporizatio r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid $\int \frac{dq}{T}$	Specific Volume s	Weight, in Pounds, of one Cubic Foot. γ	Temperature, Degrees Fahr t
384	205.43_{244}	356.9	1199.1	842.2	757.8	84.4	0.5457	2.237_{25}	0.4470_{51}	384
385	207.87_{246}	358.0	1199.4	841.4	756.9	84.5	0.5469	2.212_{25}	0.4521_{51}	385
386	210.33_{248}	359.0	1199.7	840.7	756.2	84.5	0.5481	2.187_{24}	0.4572_{51}	386
387	212.81_{250}	360.1	1200.0	839.9	755.3	84.6	0.5494	2.163_{24}	0.4623_{52}	387
388	215.31_{253}	361.1	1200.3	839.2	754.6	84.6	0.5506	2.139_{24}	0.4675_{53}	388
389	217.84_{255}	362.2	1200.6	838.4	753.8	84.6	0.5518	2.115_{23}	0.4728_{52}	389
390	220.39_{257}	363.2	1200.9	837.7	753.0	84.7	0.5531	2.092_{23}	0.4780_{53}	390
391	222.96_{260}	364.3	1201.2	836.9	752.2	84.7	0.5543	2.069_{23}	0.4833_{54}	391
392	225.56_{263}	365.3	1201.5	836.2	751.4	84.8	0.5555	2.046_{22}	0.4887_{54}	392
393	228.19_{264}	366.4	1201.8	835.4	750.6	84.8	0.5568	2.024_{22}	0.4941_{55}	393
394	230.83_{267}	367.4	1202.1	834.7	749.9	84.8	0.5580	2.002_{22}	0.4996_{55}	394
395	233.50_{269}	368.4	1202.4	834.0	749.1	84.9	0.5592	1.980_{22}	0.5051_{56}	395
396	236.19_{272}	369.5	1202.7	833.2	748.3	84.9	0.5604	1.958_{21}	0.5107_{56}	396
397	238.91_{274}	370.5	1203.0	832.5	747.6	84.9	0.5616	1.937_{21}	0.5163_{56}	397
398	241.65_{277}	371.6	1203.3	831.7	746.7	85.0	0.5629	1.916_{21}	0.5219_{58}	398
399	244.42_{279}	372.6	1203.6	831.0	746.0	85.0	0.5641	1.895_{21}	0.5277_{59}	399
400	247.21_{282}	373.7	1203.9	830.2	745.2	85.0	0.5653	1.874_{20}	0.5336_{58}	400
401	250.03_{284}	374.7	1204.2	829.5	744.5	85.0	0.5665	1.854_{20}	0.5394_{58}	401
402	252.87_{287}	375.8	1204.6	828.8	743.7	85.1	0.5677	1.834_{20}	0.5452_{60}	402
403	255.74_{289}	376.8	1204.9	828.1	743.0	85.1	0.5689	1.814_{20}	0.5512_{60}	403
404	258.63_{292}	377.9	1205.2	827.3	742.2	85.1	0.5701	1.794_{19}	0.5572_{61}	404
405	261.55_{295}	378.9	1205.5	826.6	741.4	85.2	0.5714	1.775_{19}	0.5633_{62}	405
406	264.50_{297}	380.0	1205.8	825.8	740.6	85.2	0.5726	1.756_{19}	0.5695_{61}	406
407	267.47_{300}	381.0	1206.1	825.1	739.9	85.2	0.5738	1.737_{18}	0.5756_{62}	407
408	270.47_{302}	382.0	1206.4	824.4	739.2	85.2	0.5750	1.719_{19}	0.5818_{63}	408
409	273.49_{305}	383.1	1206.7	823.6	738.3	85.3	0.5762	1.700_{18}	0.5881_{64}	409
410	276.54_{308}	384.1	1207.0	822.9	737.6	85.3	0.5774	1.682_{18}	0.5945_{65}	410
411	279.62_{311}	385.2	1207.3	822.1	736.8	85.3	0.5786	1.664_{18}	0.601_{6}	411
412	282.73_{313}	386.2	1207.6	821.4	736.1	85.3	0.5798	1.646_{17}	0.607_{7}	412
413	285.86_{316}	387.3	1207.9	820.6	735.3	85.3	0.5810	1.629_{17}	0.614_{6}	413
414	289.02_{319}	388.3	1208.2	819.9	734.5	85.4	0.5822	1.612_{17}	0.620_{7}	414
415	292.21_{321}	389.4	1208.5	819.1	733.7	85.4	0.5834	1.595_{17}	0.627_{7}	415
416	295.42_{325}	390.4	1208.8	818.4	733.0	85.4	0.5846	1.578_{17}	0.634_{7}	416
417	298.67_{327}	391.5	1209.1	817.6	732.2	85.4	0.5858	1.561_{16}	0.641_{6}	417
418	301.94_{330}	392.5	1209.4	816.9	731.5	85.4	0.5870	1.545_{17}	0.647_{7}	418
419	305.24_{333}	393.6	1209.7	816.1	730.7	85.4	0.5881	1.528_{16}	0.654_{7}	419
420	308.57_{336}	394.6	1210.0	815.4	730.0	85.4	0.5893	1.512_{16}	0.661_{7}	420
421	311.93	395.6	1210.3	814.7	729.3	85.4	0.5905	1.496	0.668	421

Temperature, Degrees Fahr. t	Pressure, Pounds per Square Inch. p		Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int \frac{c\,dt}{T}$	Specific Volume. s		Density. Weight, in Pounds, of one Cubic Foot. γ		Temperature, Degrees Fahr. t
424	322.18	347	398.8	1211.3	812.5	727.0	85.5	0.5941	1.449	15	0.690	7	**424**
425	325.65	351	399.8	1211.6	811.8	726.3	85.5	0.5953	1.434	15	0.697	8	**425**
426	329.16	354	400.9	1211.9	811.0	725.5	85.5	0.5964	1.419	15	0.705	7	**426**
427	332.70	356	401.9	1212.2	810 3	724.8	85.5	0.5976	1.404	14	0.712	7	**427**
428	336.26		403.0	1212.5	809.5	724.0	85.5	0.5988	1.390		0.719		**428**

TABLE II.

SATURATED STEAM.

ENGLISH UNITS.

Pressure, Pounds per Square Inch. p	Temperature, Degrees Fahr. t	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int \frac{dt}{T}$	Specific Volume. s	Density. Weight in Pounds of One Cubic Foot. γ	Pressure, Pounds per Square Inch. p
1	101.99$_{2428}$	70.0	1113.1	1043.0	981.1	61.9	0.1329	334.6$_{161.0}$	0.00299$_{277}$	1
2	126.27$_{1535}$	94.4	1120.5	1026.1	961.9	64.2	0.1754	173.6$_{55.2}$	0.00576$_{268}$	2
3	141.62$_{1147}$	109.8	1125.1	1015.3	949.5	65.8	0.2013	118.4$_{28.1}$	0.00844$_{263}$	3
4	153.09$_{925}$	121.4	1128.6	1007.2	940.4	66.8	0.2203	90.31$_{17.09}$	0.01107$_{259}$	4
5	162.34$_{780}$	130.7	1131.5	1000.8	933.1	67.7	0.2353	73.22$_{11.55}$	0.01366$_{256}$	5
6	170.14$_{676}$	138.6	1133.8	995.2	926.7	68.5	0.2480	61.67$_{8.30}$	0.01622$_{252}$	6
7	176.90$_{602}$	145.4	1135.9	990.5	921.4	69.1	0.2587	53.37$_{6.30}$	0.01874$_{251}$	7
8	182.92$_{541}$	151.5	1137.7	986.2	916.5	69.7	0.2682	47.07$_{4.94}$	0.02125$_{249}$	8
9	188.33$_{492}$	156.9	1139.4	982.5	912.4	70.1	0.2766	42.13$_{3.97}$	0.02374$_{247}$	9
10	193.25$_{453}$	161.9	1140.9	979.0	908.4	70.6	0.2842	38.16$_{3.28}$	0.02621$_{245}$	10
11	197.78$_{420}$	166.5	1142.3	975.8	904.8	71.0	0.2912	34.88$_{2.74}$	0.02866$_{245}$	11
12	201.98$_{391}$	170.7	1143.6	972.9	901.5	71.4	0.2976	32.14$_{2.32}$	0.03111$_{244}$	12
13	205.89$_{368}$	174.6	1144.7	970.1	898.4	71.7	0.3035	29.82$_{2.03}$	0.03355$_{245}$	13
14	209.57$_{346}$	178.3	1145.8	967.5	895.5	72.0	0.3091	27.79$_{1.64}$	0.03600$_{226}$	14
15	213.03$_{329}$	181.8	1146.9	965.1	892.6	72.5	0.3143	26.15$_{1.56}$	0.03826$_{241}$	15
16	216.32$_{312}$	185.1	1147.9	962.8	890.0	72.8	0.3192	24.59$_{1.37}$	0.04067$_{240}$	16
17	219.44$_{296}$	188.3	1148.9	960.6	887.6	73.0	0.3238	23.22$_{1.22}$	0.04307$_{240}$	17
18	222.40$_{284}$	191.3	1149.8	958.5	885.3	73.2	0.3282	22.00$_{1.10}$	0.04547$_{239}$	18
19	225.24$_{271}$	194.1	1150.7	956.6	883.2	73.4	0.3324	20.90$_{0.99}$	0.04786$_{237}$	19
20	227.95$_{260}$	196.9	1151.5	954.6	881.0	73.6	0.3363	19.91$_{90}$	0.05023$_{236}$	20
21	230.55$_{251}$	199.5	1152.3	952.8	879.0	73.8	0.3401	19.01$_{81}$	0.05259$_{236}$	21
22	233.06$_{241}$	202.0	1153.0	951.0	877.0	74.0	0.3438	18.20$_{75}$	0.05495$_{236}$	22
23	235.47$_{232}$	204.5	1153.7	949.2	875.0	74.2	0.3473	17.45$_{69}$	0.05731$_{235}$	23
24	237.79$_{225}$	206.8	1154.4	947.6	873.2	74.4	0.3506	16.76$_{63}$	0.05966$_{233}$	24
25	240.04$_{217}$	209.1	1155.1	946.0	871.5	74.5	0.3539	16.13$_{58}$	0.06199$_{233}$	25
26	242.21$_{211}$	211.2	1155.8	944.6	869.9	74.7	0.3570	15.55$_{55}$	0.06432$_{234}$	26
27	244.32$_{204}$	213.4	1156.5	943.1	868.2	74.9	0.3600	15.00$_{51}$	0.06666$_{233}$	27
28	246.36$_{198}$	215.4	1157.1	941.7	866.7	75.0	0.3629	14.49$_{46}$	0.06899$_{231}$	28
29	248.34$_{193}$	217.4	1157.7	940.3	865.1	75.2	0.3657	14.03$_{44}$	0.07130$_{230}$	29
30	250.27$_{188}$	219.4	1158.3	938.9	863.6	75.3	0.3685	13.59$_{41}$	0.07360$_{230}$	30
31	252.15$_{183}$	221.3	1158.8	937.5	862.0	75.5	0.3712	13.18$_{40}$	0.07590$_{231}$	31
32	253.98$_{178}$	223.1	1159.4	936.3	860.7	75.6	0.3737	12.78$_{37}$	0.07821$_{230}$	32
33	255.76	224.9	1159.9	935.0	859.2	75.8	0.3762	12.41	0.08051	33

Pressure, Pounds pe Square Inch. p	Temperature, Degrees Fahr t	Heat of the Liquid q	Total Heat. λ	Heat of Vaporization r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid $\int\frac{cdt}{T}$	Specific Volume s	Density. Weight, in Pounds, of one Cubic Foot. γ	Pressure, Pounds per Square Inch. p
34	257.50 $_{169}$	226.7	1160.4	933.7	857.8	75.9	0.3787	12.07 $_{32}$	0.08280 $_{228}$	34
35	259.19 $_{166}$	228.4	1161.0	932.6	856.6	76.0	0.3811	11.75 $_{30}$	0.08508 $_{228}$	35
36	260.85 $_{162}$	230.0	1161.5	931.5	855.3	76.2	0.3834	11.45 $_{29}$	0.08736 $_{228}$	36
37	262.47 $_{159}$	231.7	1162.0	930.3	854.0	76.3	0.3856	11.16 $_{28}$	0.08964 $_{227}$	37
38	264.06 $_{155}$	233.3	1162.5	929.2	852.8	76.4	0.3878	10.88 $_{26}$	0.09191 $_{226}$	38
39	265.61 $_{151}$	234.8	1163.0	928.2	851.7	76.5	0.3900	10.62 $_{25}$	0.09417 $_{227}$	39
40	267.13 $_{149}$	236.4	1163.4	927.0	850.3	76.7	0.3921	10.37 $_{24}$	0.09644 $_{225}$	40
41	268.62 $_{146}$	237.9	1163.9	926.0	849.2	76.8	0.3942	10.13 $_{22}$	0.09869 $_{221}$	41
42	270.08 $_{143}$	239.3	1164.3	925.0	848.1	76.9	0.3962	9.906 $_{216}$	0.1009 $_{23}$	42
43	271.51 $_{140}$	240.8	1164.8	924.0	847.0	77.0	0.3982	9.690 $_{206}$	0.1032 $_{22}$	43
44	272.91 $_{138}$	242.2	1165.2	923.0	845.9	77.1	0.4001	9.484 $_{197}$	0.1054 $_{23}$	44
45	274.29 $_{136}$	243.6	1165.6	922.0	844.8	77.2	0.4020	9.287 $_{190}$	0.1077 $_{22}$	45
46	275.65 $_{134}$	245.0	1166.0	921.0	843.7	77.3	0.4038	9.097 $_{183}$	0.1099 $_{23}$	46
47	276.99 $_{131}$	246.3	1166.4	920.1	842.7	77.4	0.4056	8.914 $_{174}$	0.1122 $_{22}$	47
48	278.30 $_{128}$	247.6	1166.8	919.2	841.7	77.5	0.4074	8.740 $_{167}$	0.1144 $_{22}$	48
49	279.58 $_{127}$	248.9	1167.2	918.3	840.7	77.6	0.4092	8.573 $_{159}$	0.1166 $_{22}$	49
50	280.85 $_{125}$	250.2	1167.6	917.4	839.7	77.7	0.4109	8.414 $_{155}$	0.1188 $_{23}$	50
51	282.10 $_{122}$	251.5	1168.0	916.5	838.7	77.8	0.4126	8.259 $_{149}$	0.1211 $_{22}$	51
52	283.32 $_{121}$	252.7	1168.4	915.7	837.8	77.9	0.4143	8.110 $_{142}$	0.1233 $_{22}$	52
53	284.53 $_{119}$	253.9	1168.7	914.8	836.8	78.0	0.4160	7.968 $_{138}$	0.1255 $_{22}$	53
54	285.72 $_{117}$	255.1	1169.1	914.0	835.9	78.1	0.4175	7.829 $_{133}$	0.1277 $_{22}$	54
55	286.89 $_{116}$	256.3	1169.4	913.1	834.9	78.2	0.4191	7.696 $_{128}$	0.1299 $_{22}$	55
56	288.05 $_{114}$	257.5	1169.8	912.3	834.0	78.3	0.4207	7.568 $_{125}$	0.1321 $_{23}$	56
57	289.19 $_{112}$	258.6	1170.1	911.5	833.1	78.4	0.4222	7.443 $_{120}$	0.1344 $_{22}$	57
58	290.31 $_{111}$	259.7	1170.5	910.8	832.4	78.4	0.4237	7.323 $_{115}$	0.1366 $_{21}$	58
59	291.42 $_{109}$	260.8	1170.8	910.0	831.5	78.5	0.4252	7.208 $_{112}$	0.1387 $_{22}$	59
60	292.51 $_{108}$	261.9	1171.2	909.3	830.7	78.6	0.4267	7.096 $_{109}$	0.1409 $_{22}$	60
61	293.59 $_{106}$	263.0	1171.5	908.5	829.8	78.7	0.4281	6.987 $_{105}$	0.1431 $_{22}$	61
62	294.65 $_{105}$	264.1	1171.8	907.7	828.9	78.8	0.4295	6.882 $_{103}$	0.1453 $_{22}$	62
63	295.70 $_{104}$	265.2	1172.1	906.9	828.0	78.9	0.4309	6.779 $_{99}$	0.1475 $_{22}$	63
64	296.74 $_{103}$	266.2	1172.4	906.2	827.3	78.9	0.4323	6.680 $_{97}$	0.1497 $_{22}$	64
65	297.77 $_{101}$	267.2	1172.7	905.5	826.5	79.0	0.4337	6.583 $_{93}$	0.1519 $_{22}$	65
66	298.78 $_{99}$	268.3	1173.0	904.7	825.6	79.1	0.4350	6.490 $_{89}$	0.1541 $_{21}$	66
67	299.77 $_{99}$	269.3	1173.3	904.0	824.8	79.2	0.4363	6.401 $_{87}$	0.1562 $_{22}$	67
68	300.76 $_{98}$	270.3	1173.6	903.3	824.1	79.2	0.4376	6.314 $_{86}$	0.1584 $_{22}$	68
69	301.74 $_{97}$	271.2	1173.9	902.7	823.4	79.3	0.4389	6.228 $_{84}$	0.1606 $_{22}$	69
70	302.71 $_{95}$	272.2	1174.3	902.1	822.7	79.4	0.4402	6.144 $_{81}$	0.1628 $_{21}$	70
71	303.66 $_{95}$	273.2	1174.6	901.4	821.9	79.5	0.4415	6.063 $_{79}$	0.1649 $_{22}$	71

Pressure, Pounds per Square Inch. p	Temperature, Degrees Fahr. t	Diff.	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int\frac{dq}{T}$	Specific Volume. s	Diff.	Density. Weight, Pounds per Cubic Foot. γ
74	306.46	92	276.0	1175.4	899.4	819.7	79.7	0.4452	5.834	[illegible]	0.1714
75	307.38	90	276.9	1175.7	898.8	819.1	79.7	0.4461	5.762	71	0.1736
76	308.28	90	277.8	1176.0	898.2	818.4	79.8	0.4476	5.691	70	0.1757
77	309.18	88	278.7	1176.2	897.5	817.6	79.9	0.4487	5.621	67	0.1779
78	310.06	88	279.6	1176.5	896.9	817.0	79.9	0.4499	5.554	66	0.1801
79	310.94	86	280.5	1176.8	896.3	816.3	80.0	0.4511	5.488	63	0.1822
80	311.80	86	281.4	1177.0	895.6	815.5	80.1	0.4522	5.425	63	0.1843
81	312.66	85	282.3	1177.3	895.0	814.9	80.1	0.4534	5.362	61	0.1865
82	313.51	85	283.2	1177.6	894.4	814.2	80.2	0.4545	5.301	61	0.1886
83	314.36	83	284.1	1177.8	893.7	813.4	80.3	0.4557	5.240	58	0.1908
84	315.19	83	285.0	1178.1	893.1	812.8	80.3	0.4568	5.182	[illegible]	0.1930
85	316.02	82	285.8	1178.3	892.5	812.1	80.4	0.4579	5.125	56	0.1951
86	316.84	81	286.7	1178.6	891.9	811.5	80.4	0.4590	5.069	55	0.1972
87	317.65	80	287.5	1178.8	891.3	810.8	80.5	0.4601	5.014	[illegible]	0.1994
88	318.45	80	288.4	1179.1	890.7	810.2	80.5	0.4612	4.961	[illegible]	0.2015
89	319.25	79	289.2	1179.3	890.1	809.5	80.6	0.4622	4.908	51	0.2037
90	320.04	77	290.0	1179.6	889.6	808.9	80.7	0.4633	4.858	50	0.2059
91	320.83	77	290.8	1179.8	889.0	808.3	80.7	0.4643	4.808	48	0.2080
92	321.60	77	291.6	1180.0	888.4	807.6	80.8	0.4653	4.760	48	0.2101
93	322.37	77	292.4	1180.3	887.9	807.1	80.8	0.4663	4.712	47	0.2122
94	323.14	75	293.2	1180.5	887.3	806.4	80.9	0.4673	4.665	46	0.2144
95	323.89	75	294.0	1180.7	886.7	805.8	80.9	0.4683	4.619	45	0.2165
96	324.64	74	294.8	1181.0	886.2	805.2	81.0	0.4693	4.574	44	0.2186
97	325.38	74	295.6	1181.2	885.6	804.6	81.0	0.4703	4.530	44	0.2208
98	326.12	74	296.4	1181.4	885.0	803.9	81.1	0.4713	4.486	42	0.2229
99	326.86	72	297.1	1181.6	884.5	803.4	81.1	0.4723	4.444	41	0.2250
100	327.58	72	297.9	1181.9	884.0	802.8	81.2	0.4733	4.403	41	0.2271
101	328.30	72	298.6	1182.1	883.5	802.3	81.2	0.4743	4.362	40	0.2293
102	329.02	71	299.4	1182.3	882.9	801.6	81.3	0.4752	4.322	40	0.2314
103	329.73	70	300.1	1182.5	882.4	801.1	81.3	0.4762	4.282	38	0.2335
104	330.43	70	300.9	1182.7	881.8	800.4	81.4	0.4771	4.244	[illegible]	0.2357
105	331.13	70	301.6	1182.9	881.3	799.9	81.4	0.4780	4.206	[illegible]	0.2378
106	331.83	69	302.3	1183.1	880.8	799.3	81.5	0.4790	4.169	37	0.2399
107	332.52	68	303.0	1183.4	880.4	798.9	81.5	0.4799	4.132	36	0.2420
108	333.20	68	303.8	1183.6	879.8	798.2	81.6	0.4808	4.096	[illegible]	0.2441
109	333.88	[illegible]	304.5	1183.8	879.3	797.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Pressure, Pounds pe[r] Square Inch. p	Temperature, Degrees Fahr[enheit]. t	Heat of the Liquid[.] q	Total Heat. λ	Heat of Vaporization[.] r	Heat equivalen[t] of Internal Work. ρ	Heat equivalen[t] of External Work. Apu	Entropy of the Liquid[.] $\int\frac{c\,dt}{T}$	Specific Volume[.] s	DENSITY. Weight, in Pounds, of one Cubic Foot. γ	Pressure, Pounds per Square Inch. p
114	337.20_{66}	308.0	1184.8	876.8	795.0	81.8	0.4860	3.894_{32}	0.2568_{21}	114
115	337.86_{64}	308.7	1185.0	876.3	794.4	81.9	0.4869	3.862_{31}	0.2589_{21}	115
116	338.50_{64}	309.4	1185.2	875.8	793.9	81.9	0.4877	3.831_{30}	0.2610_{21}	116
117	339.14_{64}	310.0	1185.4	875.4	793.5	81.9	0.4886	3.801_{31}	0.2631_{22}	117
118	339.78_{64}	310.7	1185.6	874.9	792.9	82.0	0.4894	3.770_{30}	0.2653_{21}	118
119	340.42_{63}	311.4	1185.8	874.4	792.4	82.0	0.4903	3.740_{29}	0.2674_{21}	119
120	341.05_{62}	312.0	1186.0	874.0	791.9	82.1	0.4911	3.711_{28}	0.2695_{20}	120
121	341.67_{62}	312.7	1186.2	873.5	791.4	82.1	0.4919	3.683_{28}	0.2715_{21}	121
122	342.29_{62}	313.3	1186.3	873.0	790.8	82.2	0.4927	3.655_{28}	0.2736_{21}	122
123	342.91_{61}	314.0	1186.5	872.5	790.3	82.2	0.4935	3.627_{28}	0.2757_{22}	123
124	343.52_{61}	314.6	1186.7	872.1	789.9	82.2	0.4943	3.599_{27}	0.2779_{21}	124
125	344.13_{60}	315.2	1186.9	871.7	789.4	82.3	0.4951	3.572_{26}	0.2800_{20}	125
126	344.73_{60}	315.9	1187.1	871.2	788.9	82.3	0.4959	3.546_{26}	0.2820_{21}	126
127	345.33_{60}	316.5	1187.3	870.8	788.4	82.4	0.4967	3.520_{26}	0.2841_{21}	127
128	345.93_{60}	317.1	1187.4	870.3	787.9	82.4	0.4974	3.494_{25}	0.2862_{21}	128
129	346.53_{59}	317.7	1187.6	869.9	787.5	82.4	0.4982	3.469_{25}	0.2883_{21}	129
130	347.12_{59}	318.4	1187.8	869.4	786.9	82.5	0.4990	3.444_{25}	0.2904_{21}	130
131	347.71_{58}	319.0	1188.0	869.0	786.5	82.5	0.4997	3.419_{24}	0.2925_{21}	131
132	348.29_{58}	319.6	1188.2	868.6	786.1	82.5	0.5005	3.395_{24}	0.2946_{21}	132
133	348.87_{58}	320.2	1188.4	868.2	785.6	82.6	0.5012	3.371_{24}	0.2967_{21}	133
134	349.45_{58}	320.8	1188.5	867.7	785.1	82.6	0.5020	3.347_{24}	0.2988_{21}	134
135	350.03_{57}	321.4	1188.7	867.3	784.7	82.6	0.5027	3.323_{23}	0.3009_{21}	135
136	350.60_{57}	322.0	1188.9	866.9	784.2	82.7	0.5035	3.300_{23}	0.3030_{21}	136
137	351.17_{56}	322.6	1189.0	866.4	783.7	82.7	0.5042	3.277_{22}	0.3051_{21}	137
138	351.73_{56}	323.2	1189.2	866.0	783.3	82.7	0.5049	3.255_{21}	0.3072_{20}	138
139	352.29_{56}	323.8	1189.4	865.6	782.8	82.8	0.5056	3.234_{22}	0.3092_{21}	139
140	352.85_{55}	324.4	1189.5	865.1	782.3	82.8	0.5064	3.212_{21}	0.3113_{21}	140
141	353.40_{55}	325.0	1189.7	864.7	781.9	82.8	0.5071	3.191_{21}	0.3134_{21}	141
142	353.95_{55}	325.6	1189.9	864.3	781.4	82.9	0.5078	3.170_{21}	0.3155_{21}	142
143	354.50_{55}	326.1	1190.1	864.0	781.1	82.9	0.5085	3.149_{21}	0.3176_{21}	143
144	355.05_{54}	326.7	1190.2	863.5	780.6	82.9	0.5092	3.128_{21}	0.3197_{21}	144
145	355.59_{54}	327.2	1190.4	863.2	780.2	83.0	0.5099	3.107_{20}	0.3218_{21}	145
146	356.13_{54}	327.8	1190.6	862.8	779.8	83.0	0.5106	3.087_{19}	0.3239_{20}	146
147	356.67_{53}	328.3	1190.7	862.4	779.4	83.0	0.5113	3.068_{19}	0.3259_{21}	147
148	357.20_{53}	328.9	1190.9	862.0	778.9	83.1	0.5119	3.049_{19}	0.3280_{20}	148
149	357.73_{53}	329.4	1191.0	861.6	778.5	83.1	0.5126	3.030_{19}	0.3300_{21}	149
150	358.26_{52}	330.0	1191.2	861.2	778.1	83.1	0.5133	3.011_{19}	0.3321_{21}	150
151	358.78_{52}	330.5	1191.4	860.9	777.7	83.2	0.5140	2.992_{19}	0.3342_{21}	151

Pressure, Pounds per Square Inch. p	Temperature, Degrees Fahr. t	Diff.	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int \frac{dt}{T}$	Specific Volume. s	Diff.	Density. Weight, in Pounds, of one Cubic Foot. γ	Diff.	Pressure, Pounds per Square Inch. p
154	360.34	52	332.2	1191.8	859.6	776.3	83.3	0.5160	2.937	18	0.3405	21	154
155	360.86	51	332.7	1192.0	859.3	776.0	83.3	0.5166	2.919	18	0.3426	21	155
156	361.37	51	333.3	1192.2	858.9	775.6	83.3	0.5173	2.901	17	0.3447	20	156
157	361.88	51	333.8	1192.3	858.5	775.2	83.3	0.5179	2.884	17	0.3467	21	157
158	362.39	51	334.3	1192.5	858.2	774.8	83.4	0.5186	2.867	17	0.3488	21	158
159	362.90	50	334.9	1192.7	857.8	774.4	83.4	0.5192	2.850	17	0.3509	21	159
160	363.40	50	335.4	1192.8	857.4	774.0	83.4	0.5198	2.833	17	0.3530	21	160
161	363.90	50	335.9	1193.0	857.1	773.7	83.4	0.5205	2.816	17	0.3551	21	161
162	364.40	50	336.4	1193.1	856.7	773.2	83.5	0.5211	2.799	16	0.3572	21	162
163	364.90	49	337.0	1193.3	856.3	772.8	83.5	0.5217	2.783	16	0.3593	21	163
164	365.39	49	337.5	1193.4	855.9	772.4	83.5	0.5224	2.767	16	0.3614	21	164
165	365.88	49	338.0	1193.6	855.6	772.0	83.6	0.5230	2.751	15	0.3635	20	165
166	366.37	48	338.5	1193.7	855.2	771.6	83.6	0.5236	2.736	15	0.3655	20	166
167	366.85	48	339.0	1193.9	854.9	771.3	83.6	0.5242	2.721	15	0.3675	20	167
168	367.33	48	339.5	1194.0	854.5	770.9	83.6	0.5248	2.706	15	0.3695	21	168
169	367.81	48	340.0	1194.2	854.2	770.5	83.7	0.5254	2.691	15	0.3716	21	169
170	368.29	48	340.5	1194.3	853.8	770.1	83.7	0.5260	2.676	15	0.3737	21	170
171	368.77	47	341.0	1194.4	853.4	769.7	83.7	0.5266	2.661	14	0.3758	20	171
172	369.24	47	341.5	1194.6	853.1	769.4	83.7	0.5272	2.647	15	0.3778	21	172
173	369.71	47	342.0	1194.7	852.7	768.9	83.8	0.5278	2.632	14	0.3799	21	173
174	370.18	47	342.5	1194.8	852.3	768.5	83.8	0.5284	2.618	15	0.3820	21	174
175	370.65	47	343.0	1195.0	852.0	768.2	83.8	0.5290	2.603	14	0.3841	21	175
176	371.12	47	343.5	1195.1	851.6	767.8	83.8	0.5296	2.589	14	0.3862	21	176
177	371.59	46	344.0	1195.3	851.3	767.5	83.8	0.5302	2.575	14	0.3883	21	177
178	372.05	46	344.4	1195.4	851.0	767.1	83.9	0.5308	2.561	13	0.3904	21	178
179	372.51	46	344.9	1195.6	850.7	766.8	83.9	0.5313	2.548	13	0.3925	20	179
180	372.97	46	345.4	1195.7	850.3	766.4	83.9	0.5319	2.535	13	0.3945	21	180
181	373.43	45	345.9	1195.9	850.0	766.1	83.9	0.5325	2.522	14	0.3966	21	181
182	373.88	45	346.4	1196.0	849.6	765.6	84.0	0.5331	2.508	13	0.3987	21	182
183	374.33	45	346.8	1196.1	849.3	765.3	84.0	0.5336	2.495	13	0.4008	21	183
184	374.78	45	347.3	1196.2	848.9	764.9	84.0	0.5342	2.482	12	0.4029	20	184
185	375.23	45	347.8	1196.4	848.6	764.6	84.0	0.5347	2.470	13	0.4049	21	185
186	375.68	44	348.2	1196.5	848.3	764.3	84.0	0.5353	2.457	12	0.4070	20	186
187	376.12	44	348.7	1196.6	847.9	763.8	84.1	0.5359	2.445	13	0.4090	21	187
188	376.56	44	349.2	1196.8	847.6	763.5	84.1	0.5364	2.432	12	0.4111	21	188
189	377.00	44	349.6	1196.9	847.3	763.2	84.1	0.5370	2.420	12	0.4132	21	189
190	377.44	44	350.1	1197.1	847.0	762.9	84.1	0.5375	2.408	12	0.4153	21	190

Pressure, Pounds per Square Inch. p	Temperature, Degrees Fahr. t	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int \frac{cdt}{T}$	Specific Volume. s	DENSITY. Weight, in Pounds, of one Cubic Foot. γ	Pressure, Pounds per Square Inch. p
194	379.18 $_{43}$	351.9	1197.6	845.7	761.5	84.2	0.5397	2.361 $_{12}$	0.4236 $_{21}$	194
195	379.61 $_{43}$	352.4	1197.7	845.3	761.1	84.2	0.5402	2.349 $_{12}$	0.4257 $_{21}$	195
196	380.04 $_{43}$	352.8	1197.8	845.0	760.8	84.2	0.5408	2.337 $_{12}$	0.4278 $_{20}$	196
197	380.47 $_{42}$	353.3	1198.0	844.7	760.4	84.3	0.5413	2.325 $_{11}$	0.4298 $_{20}$	197
198	380.89 $_{42}$	353.7	1198.1	844.4	760.1	84.3	0.5418	2.314 $_{10}$	0.4318 $_{20}$	198
199	381.31 $_{42}$	354.1	1198.2	844.1	759.8	84.3	0.5423	2.304 $_{10}$	0.4338 $_{21}$	199
200	381.73 $_{42}$	354.6	1198.4	843.8	759.5	84.3	0.5429	2.294 $_{10}$	0.4359 $_{20}$	200
201	382.15 $_{42}$	355.0	1198.5	843.5	759.1	84.4	0.5434	2.284 $_{10}$	0.4379 $_{20}$	201
202	382.57 $_{42}$	355.4	1198.6	843.2	758.8	84.4	0.5439	2.274 $_{11}$	0.4399 $_{21}$	202
203	382.99 $_{42}$	355.9	1198.8	842.9	758.5	84.4	0.5444	2.263 $_{11}$	0.4420 $_{21}$	203
204	383.41 $_{41}$	356.3	1198.9	842.6	758.2	84.4	0.5449	2.252 $_{11}$	0.4441 $_{20}$	204
205	383.82 $_{41}$	356.8	1199.0	842.2	757.8	84.4	0.5454	2.241 $_{10}$	0.4461 $_{21}$	205
206	384.23 $_{41}$	357.2	1199.1	841.9	757.4	84.5	0.5459	2.231 $_{10}$	0.4482 $_{21}$	206
207	384.64 $_{41}$	357.6	1199.3	841.7	757.2	84.5	0.5465	2.221 $_{10}$	0.4503 $_{21}$	207
208	385.05 $_{41}$	358.0	1199.4	841.4	756.9	84.5	0.5470	2.211 $_{11}$	0.4524 $_{20}$	208
209	385.46 $_{41}$	358.5	1199.5	841.0	756.5	84.5	0.5475	2.200 $_{10}$	0.4544 $_{21}$	209
210	385.87 $_{41}$	358.9	1199.6	840.7	756.2	84.5	0.5480	2.190 $_{10}$	0.4565 $_{21}$	210
211	386.28 $_{40}$	359.3	1199.8	840.5	756.0	84.5	0.5485	2.180 $_{9}$	0.4586 $_{21}$	211
212	386.68 $_{40}$	359.7	1199.9	840.2	755.6	84.6	0.5489	2.171 $_{9}$	0.4607 $_{20}$	212
213	387.08 $_{40}$	360.1	1200.0	839.9	755.3	84.6	0.5494	2.162 $_{10}$	0.4627 $_{21}$	213
214	387.48 $_{40}$	360.6	1200.1	839.5	754.9	84.6	0.5499	2.152 $_{10}$	0.4648 $_{21}$	214
215	387.88 $_{40}$	361.0	1200.2	839.2	754.6	84.6	0.5504	2.142 $_{10}$	0.4669 $_{21}$	215
216	388.28 $_{39}$	361.4	1200.4	839.0	754.4	84.6	0.5509	2.132 $_{9}$	0.4690 $_{21}$	216
217	388.67 $_{39}$	361.8	1200.5	838.7	754.1	84.6	0.5514	2.123 $_{9}$	0.4711 $_{20}$	217
218	389.06 $_{39}$	362.2	1200.6	838.4	753.8	84.6	0.5519	2.114 $_{9}$	0.4731 $_{20}$	218
219	389.45 $_{39}$	362.6	1200.7	838.1	753.4	84.7	0.5524	2.105 $_{9}$	0.4751 $_{21}$	219
220	389.84 $_{39}$	363.0	1200.8	837.8	753.1	84.7	0.5529	2.096 $_{9}$	0.4772 $_{20}$	220
221	390.23 $_{39}$	363.5	1201.0	837.5	752.8	84.7	0.5533	2.087 $_{9}$	0.4792 $_{21}$	221
222	390.62 $_{39}$	363.9	1201.1	837.2	752.5	84.7	0.5538	2.078 $_{9}$	0.4813 $_{21}$	222
223	391.01 $_{39}$	364.3	1201.2	836.9	752.2	84.7	0.5543	2.069 $_{9}$	0.4834 $_{21}$	223
224	391.40 $_{39}$	364.7	1201.3	836.6	751.9	84.7	0.5548	2.060 $_{9}$	0.4855 $_{21}$	224
225	391.79 $_{38}$	365.1	1201.4	836.3	751.6	84.7	0.5553	2.051 $_{9}$	0.4876 $_{21}$	225
226	392.17 $_{38}$	365.5	1201.6	836.1	751.3	84.8	0.5557	2.042 $_{8}$	0.4896 $_{21}$	226
227	392.55 $_{38}$	365.9	1201.7	835.8	751.0	84.8	0.5562	2.034 $_{8}$	0.4917 $_{20}$	227
228	392.93 $_{38}$	366.3	1201.8	835.5	750.7	84.8	0.5567	2.026 $_{9}$	0.4939 $_{20}$	228
229	393.31 $_{38}$	366.7	1201.9	835.2	750.4	84.8	0.5571	2.017 $_{8}$	0.4959 $_{20}$	229
230	393.69 $_{38}$	367.1	1202.0	834.9	750.1	84.8	0.5576	2.009 $_{8}$	0.4979 $_{21}$	230
231	394.07	367.5	1202.1	834.6	749.8	84.8	0.5581	2.001 $_{9}$	0.5000 $_{21}$	231

Pressure, Pounds per Square Inch. p	Temperature, Degrees Fahr. t	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int \frac{dq}{T}$	Specific Volume s	Density. Weight in Pounds of one Cubic Foot. γ	Pressure, Pounds per Square Inch. p
234	395.19_{37}	368.6	1202.5	833.9	749.0	84.9	0.5594	1.976_{8}	0.5062_{20}	234
235	395.56_{37}	369.0	1202.6	833.6	748.7	84.9	0.5599	1.968_{8}	0.5082_{21}	235
236	395.93_{37}	369.4	1202.7	833.3	748.4	84.9	0.5603	1.960_{8}	0.5103_{20}	236
237	396.30_{37}	369.8	1202.8	833.0	748.1	84.9	0.5608	1.952_{8}	0.5123_{21}	237
238	396.67_{37}	370.2	1202.9	832.7	747.8	84.9	0.5612	1.944_{8}	0.5144_{21}	238
239	397.04_{37}	370.6	1203.0	832.4	747.5	84.9	0.5617	1.936_{8}	0.5165_{21}	239
240	397.41_{36}	371.0	1203.2	832.2	747.3	84.9	0.5621	1.928_{7}	0.5186_{20}	240
241	397.77_{36}	371.3	1203.3	832.0	747.0	85.0	0.5626	1.921_{8}	0.5206_{20}	241
242	398.13_{36}	371.7	1203.4	831.7	746.7	85.0	0.5630	1.913_{7}	0.5226_{21}	242
243	398.49_{36}	372.1	1203.5	831.4	746.4	85.0	0.5635	1.906_{8}	0.5247_{21}	243
244	398.85_{36}	372.5	1203.6	831.1	746.1	85.0	0.5639	1.898_{7}	0.5268_{21}	244
245	399.21_{36}	372.8	1203.7	830.9	745.9	85.0	0.5643	1.891_{8}	0.5289_{22}	245
246	399.57_{36}	373.2	1203.8	830.6	745.6	85.0	0.5648	1.883_{8}	0.5311_{21}	246
247	399.93_{36}	373.6	1203.9	830.3	745.3	85.0	0.5652	1.875_{7}	0.5332_{21}	247
248	400.29_{35}	374.0	1204.0	830.0	745.0	85.0	0.5656	1.868_{7}	0.5353_{20}	248
249	400.64_{35}	374.3	1204.1	829.8	744.8	85.0	0.5661	1.861_{7}	0.5373_{20}	249
250	400.99_{35}	374.7	1204.2	829.5	744.5	85.0	0.5665	1.854_{7}	0.5393_{20}	250
251	401.34_{35}	375.1	1204.4	829.3	744.2	85.1	0.5669	1.847_{7}	0.5413_{20}	251
252	401.69_{35}	375.4	1204.5	829.1	744.0	85.1	0.5673	1.840_{7}	0.5433_{21}	252
253	402.04_{35}	375.8	1204.6	828.8	743.7	85.1	0.5678	1.833_{7}	0.5454_{21}	253
254	402.39_{35}	376.2	1204.7	828.5	743.4	85.1	0.5682	1.826_{7}	0.5475_{21}	254
255	402.74_{35}	376.5	1204.8	828.3	743.2	85.1	0.5686	1.819_{7}	0.5496_{21}	255
256	403.09_{35}	376.9	1204.9	828.0	742.9	85.1	0.5690	1.812_{7}	0.5517_{21}	256
257	403.44_{35}	377.3	1205.0	827.7	742.6	85.1	0.5695	1.805_{7}	0.5538_{21}	257
258	403.79_{34}	377.6	1205.1	827.5	742.4	85.1	0.5699	1.798_{6}	0.5559_{21}	258
259	404.13_{34}	378.0	1205.2	827.2	742.1	85.1	0.5703	1.792_{7}	0.5580_{21}	259
260	404.47_{34}	378.4	1205.3	826.9	741.7	85.2	0.5707	1.785_{6}	0.5601_{20}	260
261	404.81_{34}	378.7	1205.4	826.7	741.5	85.2	0.5711	1.779_{6}	0.5621_{21}	261
262	405.15_{34}	379.1	1205.5	826.4	741.2	85.2	0.5715	1.773_{7}	0.5642_{21}	262
263	405.49_{34}	379.4	1205.6	826.2	741.0	85.2	0.5719	1.766_{7}	0.5663_{21}	263
264	405.83_{34}	379.8	1205.7	825.9	740.7	85.2	0.5724	1.759_{6}	0.5684_{21}	264
265	406.17_{34}	380.2	1205.8	825.6	740.4	85.2	0.5728	1.753_{7}	0.5705_{21}	265
266	406.51_{33}	380.5	1205.9	825.4	740.2	85.2	0.5732	1.746_{6}	0.5726_{20}	266
267	406.84_{34}	380.8	1206.0	825.2	740.0	85.2	0.5736	1.740_{6}	0.5746_{21}	267
268	407.18_{34}	381.2	1206.1	824.9	739.7	85.2	0.5740	1.734_{6}	0.5767_{21}	268
269	407.52_{33}	381.5	1206.2	824.7	739.5	85.2	0.5744	1.728_{6}	0.5788_{21}	269
270	407.85_{33}	381.9	1206.3	824.4	739.2	85.2	0.5748	1.722_{6}	0.5809_{20}	270

Pressure, Pounds per Square Inch. p	Temperature, Degrees Fahr. t	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int\frac{cdt}{T}$	Specific Volume. s	Density. Weight, in Pounds, of one Cubic Foot. γ	Pressure, Pounds per Square Inch. p
274	409.17_{33}	383.3	1206.7	823.4	738.1	85.3	0.5764	1.697_{6}	0.5892_{21}	274
275	409.50_{33}	383.6	1206.8	823.2	737.9	85.3	0.5768	1.691_{6}	0.5913_{21}	275
276	409.83_{33}	384.0	1206.9	822.9	737.6	85.3	0.5772	1.685_{6}	0.5934_{21}	276
277	410.16_{32}	384.3	1207.0	822.7	737.4	85.3	0.5776	1.679_{6}	0.5955_{21}	277
278	410.48_{32}	384.6	1207.1	822.5	737.2	85.3	0.5779	1.673_{5}	0.5976_{21}	278
279	410.80_{32}	385.0	1207.2	822.2	736.9	85.3	0.5783	1.668_{6}	0.5997_{23}	279
280	411.12_{32}	385.3	1207.3	822.0	736.7	85.3	0.5787	1.662_{6}	0.602_{2}	280
281	411.44_{32}	385.6	1207.4	821.8	736.5	85.3	0.5791	1.656_{6}	0.604_{2}	281
282	411.76_{32}	386.0	1207.5	821.5	736.2	85.3	0.5795	1.650_{5}	0.606_{2}	282
283	412.08_{32}	386.3	1207.6	821.3	736.0	85.3	0.5799	1.645_{6}	0.608_{2}	283
284	412.40_{32}	386.6	1207.7	821.1	735.8	85.3	0.5803	1.639_{5}	0.610_{2}	284
285	412.72_{32}	387.0	1207.8	820.8	735.5	85.3	0.5806	1.634_{6}	0.612_{2}	285
286	413.04_{32}	387.3	1207.9	820.6	735.3	85.3	0.5810	1.628_{5}	0.614_{2}	286
287	413.36_{32}	387.7	1208.0	820.3	735.0	85.3	0.5814	1.623_{6}	0.616_{2}	287
288	413.68_{32}	388.0	1208.1	820.1	734.7	85.4	0.5818	1.617_{5}	0.618_{2}	288
289	414.00_{32}	388.3	1208.2	819.9	734.5	85.4	0.5822	1.612_{5}	0.620_{2}	289
290	414.32_{31}	388.6	1208.3	819.7	734.3	85.4	0.5826	1.607_{6}	0.622_{3}	290
291	414.63_{31}	389.0	1208.4	819.4	734.0	85.4	0.5829	1.601_{5}	0.625_{2}	291
292	414.94_{31}	389.3	1208.5	819.2	733.8	85.4	0.5833	1.596_{5}	0.627_{2}	292
293	415.25_{31}	389.6	1208.6	819.0	733.6	85.4	0.5837	1.591_{6}	0.629_{2}	293
294	415.56_{31}	390.0	1208.7	818.7	733.3	85.4	0.5840	1.585_{5}	0.631_{2}	294
295	415.87_{31}	390.3	1208.8	818.5	733.1	85.4	0.5844	1.580_{5}	0.633_{2}	295
296	416.18_{31}	390.6	1208.9	818.3	732.9	85.4	0.5848	1.575_{5}	0.635_{2}	296
297	416.49_{31}	390.9	1209.0	818.1	732.7	85.4	0.5851	1.570_{6}	0.637_{2}	297
298	416.80_{31}	391.3	1209.1	817.8	732.4	85.4	0.5855	1.564_{5}	0.639_{2}	298
299	417.11_{31}	391.6	1209.2	817.6	732.2	85.4	0.5859	1.559_{5}	0.641_{3}	299
300	417.42_{30}	391.9	1209.3	817.4	732.0	85.4	0.5863	1.554_{5}	0.644_{2}	300
301	417.72_{30}	392.2	1209.3	817.1	731.7	85.4	0.5866	1.549_{5}	0.646_{2}	301
302	418.02_{30}	392.5	1209.4	816.9	731.5	85.4	0.5870	1.544_{5}	0.648_{2}	302
303	418.32_{30}	392.8	1209.5	816.7	731.3	85.4	0.5873	1.539_{5}	0.650_{2}	303
304	418.62_{30}	393.2	1209.6	816.4	731.0	85.4	0.5877	1.534_{5}	0.652_{2}	304
305	418.92_{30}	393.5	1209.7	816.2	730.8	85.4	0.5880	1.529_{5}	0.654_{2}	305
306	419.22_{30}	393.8	1209.8	816.0	730.6	85.4	0.5884	1.524_{4}	0.656_{2}	306
307	419.52_{30}	394.1	1209.9	815.8	730.4	85.4	0.5888	1.520_{5}	0.658_{2}	307
308	419.82_{30}	394.4	1210.0	815.6	730.2	85.4	0.5891	1.515_{5}	0.660_{2}	308
309	420.12_{30}	394.7	1210.1	815.4	730.0	85.4	0.5895	1.510_{5}	0.662_{2}	309
310	420.42_{30}	395.0	1210.2	815.2	729.8	85.4	0.5898	1.505_{5}	0.664_{2}	310

Pressure, Pounds per Square Inch. p	Temperature, Degrees Fahr. t	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int \frac{cdt}{T}$	Specific Volume. s	Density. Weight, in Pounds, of one Cubic Foot. γ	Pressure, Pounds per Square Inch. p
314	421.62_{30}	396.3	1210.5	814.2	728.7	85.5	0.5913	1.486_{5}	0.673_{2}	314
315	421.92_{29}	396.6	1210.6	814.0	728.5	85.5	0.5916	1.481_{4}	0.675_{2}	315
316	422.21_{29}	396.9	1210.7	813.8	728.3	85.5	0.5919	1.477_{5}	0.677_{2}	316
317	422.50_{29}	397.2	1210.8	813.6	728.1	85.5	0.5923	1.472_{4}	0.679_{2}	317
318	422.79_{29}	397.5	1210.9	813.4	727.9	85.5	0.5926	1.468_{4}	0.681_{2}	318
319	423.08_{29}	397.8	1211.0	813.2	727.7	85.5	0.5930	1.464_{5}	0.683_{2}	319
320	423.37_{29}	398.1	1211.1	813.0	727.5	85.5	0.5933	1.459_{5}	0.685_{3}	320
321	423.66_{29}	398.4	1211.2	812.8	727.3	85.5	0.5937	1.454_{4}	0.688_{2}	321
322	423.95_{29}	398.7	1211.2	812.5	727.0	85.5	0.5940	1.450_{5}	0.690_{2}	322
323	424.24_{29}	399.0	1211.3	812.3	726.8	85.5	0.5944	1.445_{4}	0.692_{2}	323
324	424.53_{29}	399.3	1211.4	812.1	726.6	85.5	0.5947	1.441_{4}	0.694_{2}	324
325	424.82_{28}	399.6	1211.5	811.9	726.4	85.5	0.5950	1.437_{5}	0.696_{2}	325
326	425.10_{28}	399.9	1211.6	811.7	726.2	85.5	0.5954	1.432_{4}	0.698_{2}	326
327	425.38_{29}	400.2	1211.7	811.5	726.0	85.5	0.5957	1.428_{4}	0.700_{2}	327
328	425.67_{29}	400.5	1211.8	811.3	725.8	85.5	0.5960	1.424_{4}	0.702_{2}	328
329	425.96_{28}	400.8	1211.9	811.1	725.6	85.5	0.5964	1.420_{5}	0.704_{3}	329
330	426.24_{28}	401.1	1211.9	810.8	725.3	85.5	0.5967	1.415_{4}	0.707_{2}	330
331	426.52_{28}	401.4	1212.0	810.6	725.1	85.5	0.5970	1.411_{4}	0.709_{2}	331
332	426.80_{28}	401.7	1212.1	810.4	724.9	85.5	0.5974	1.407_{4}	0.711_{2}	332
333	427.08_{28}	402.0	1212.2	810.2	724.7	85.5	0.5977	1.403_{4}	0.713_{2}	333
334	427.36_{28}	402.3	1212.3	810.0	724.5	85.5	0.5980	1.399_{4}	0.715_{2}	334
335	427.64_{28}	402.6	1212.4	809.8	724.3	85.5	0.5984	1.395_{4}	0.717_{2}	335
336	427.92	402.9	1212.5	809.6	724.1	85.5	0.5987	1.391	0.719	336

TABLE III.

SATURATED STEAM.

FRENCH UNITS.

Temperature, Degrees Centigrade. t	Pressure, Millimeters of Mercury. p	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int \frac{cdt}{T}$	Specific Volume. s	Density. Weight, in Kilos, of one Cubic Meter. γ	Temperature, Degrees Centigrade. t
0	4.602_{339}	0.000	606.5	606.5	575.5	31.0	0.00000	211.5_{138}	0.004730_{327}	0
1	4.941_{362}	1.007	606.8	605.8	574.7	31.1	0.00367	197.7_{131}	0.005057_{360}	1
2	5.303_{386}	2.014	607.1	605.1	573.9	31.2	0.00733	184.6_{122}	0.005417_{383}	2
3	5.689_{411}	3.022	607.4	604.4	573.2	31.2	0.01098	172.4_{112}	0.005800_{403}	3
4	6.100_{436}	4.029	607.7	603.7	572.4	31.3	0.01461	161.2_{104}	0.006203_{427}	4
5	6.536_{465}	5.036	608.0	603.0	571.6	31.4	0.01823	150.8_{96}	0.006630_{450}	5
6	7.001_{493}	6.040	608.3	602.3	570.8	31.5	0.02183	141.2_{90}	0.007080_{481}	6
7	7.494_{525}	7.045	608.6	601.6	570.0	31.6	0.02542	132.2_{83}	0.007561_{508}	7
8	8.019_{557}	8.049	608.9	600.9	569.3	31.6	0.02899	123.9_{77}	0.008069_{539}	8
9	8.576_{591}	9.054	609.2	600.1	568.4	31.7	0.03255	116.2_{72}	0.008608_{569}	9
10	9.167_{628}	10.058	609.6	599.5	567.7	31.8	0.03609	109.0_{67}	0.009177_{602}	10
11	9.795_{665}	11.060	609.9	598.8	566.9	31.9	0.03962	102.3_{62}	0.009779_{631}	11
12	10.460_{704}	12.064	610.2	598.1	566.1	32.0	0.04313	96.09_{590}	0.01041_{67}	12
13	11.164_{747}	13.063	610.5	597.4	565.3	32.1	0.04663	90.19_{543}	0.01108_{71}	13
14	11.911_{791}	14.064	610.8	596.7	564.5	32.2	0.05012	84.76_{507}	0.01179_{76}	14
15	12.702_{837}	15.066	611.1	596.0	563.8	32.2	0.05359	79.69_{472}	0.01255_{79}	15
16	13.539_{884}	16.066	611.4	595.3	563.0	32.3	0.05705	74.97_{441}	0.01334_{83}	16
17	14.423_{937}	17.066	611.7	594.6	562.2	32.4	0.06050	70.56_{412}	0.01417_{88}	17
18	15.360_{989}	18.066	612.0	593.9	561.4	32.5	0.06393	66.44_{386}	0.01505_{93}	18
19	16.349_{1046}	19.066	612.3	593.2	560.6	32.6	0.06735	62.58_{360}	0.01598_{97}	19
20	17.395_{1103}	20.066	612.6	592.5	559.8	32.7	0.07076	58.98_{337}	0.01695_{103}	20
21	18.498_{1165}	21.064	612.9	591.8	559.0	32.8	0.07415	55.61_{315}	0.01798_{108}	21
22	19.663_{1229}	22.063	613.2	591.1	558.2	32.9	0.07754	52.46_{295}	0.01906_{114}	22
23	20.892_{1296}	23.061	613.5	590.4	557.5	32.9	0.08091	49.51_{277}	0.02020_{119}	23
24	22.188_{1366}	24.059	613.8	589.7	556.7	33.0	0.08427	46.74_{259}	0.02139_{126}	24
25	23.554_{1440}	25.058	614.1	589.0	555.9	33.1	0.08762	44.15_{243}	0.02265_{132}	25
26	24.994_{1516}	26.053	614.4	588.3	555.1	33.2	0.09094	41.72_{227}	0.02397_{138}	26
27	26.510_{1597}	27.048	614.7	587.7	554.4	33.3	0.09426	39.45_{214}	0.02535_{145}	27
28	28.107_{1679}	28.042	615.0	587.0	553.6	33.4	0.09756	37.31_{201}	0.02680_{153}	28
29	29.786_{1767}	29.037	615.3	586.3	552.8	33.5	0.10085	35.30_{188}	0.02833_{159}	29
30	31.553_{1858}	30.032	615.7	585.7	552.1	33.6	0.10413	33.42_{177}	0.02992_{168}	30

Temperature, Degrees Centigrade. t	Pressure, Millimeters of Mercury. p	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int \frac{cdt}{T}$	Specific Volume. s	Density. Weight, in Kilos, of one Cubic Meter. γ	Temperature, Degrees Centigrade. t
31	33.411 $_{1953}$	31.027	616.0	585.0	551.3	33.7	0.10740	31.65 $_{167}$	0.03160 $_{175}$	31
32	35.364 $_{2052}$	32.023	616.3	584.3	550.5	33.8	0.11067	29.98 $_{156}$	0.03335 $_{184}$	32
33	37.416 $_{2155}$	33.018	616.6	583.6	549.7	33.9	0.11392	28.42 $_{148}$	0.03519 $_{193}$	33
34	39.571 $_{2262}$	34.014	616.9	582.9	548.9	34.0	0.11716	26.94 $_{138}$	0.03712 $_{201}$	34
35	41.833 $_{2374}$	35.009	617.2	582.2	548.2	34.0	0.12039	25.56 $_{131}$	0.03913 $_{211}$	35
36	44.207 $_{2490}$	36.007	617.5	581.5	547.4	34.1	0.12362	24.25 $_{123}$	0.04124 $_{220}$	36
37	46.697 $_{2611}$	37.005	617.8	580.8	546.6	34.2	0.12683	23.02 $_{116}$	0.04344 $_{230}$	37
38	49.308 $_{2742}$	38.004	618.1	580.1	545.8	34.3	0.13004	21.86 $_{109}$	0.04574 $_{241}$	38
39	52.05 $_{286}$	39.002	618.4	579.4	545.0	34.4	0.13324	20.77 $_{103}$	0.04815 $_{251}$	39
40	54.91 $_{301}$	40.0	618.7	578.7	544.2	34.5	0.1364	19.74 $_{98}$	0.05066 $_{263}$	40
41	57.92 $_{314}$	41.0	619.0	578.0	543.4	34.6	0.1396	18.76 $_{92}$	0.05329 $_{275}$	41
42	61.06 $_{329}$	42.0	619.3	577.3	542.6	34.7	0.1428	17.84 $_{86}$	0.05604 $_{285}$	42
43	64.35 $_{345}$	43.0	619.6	576.6	541.8	34.8	0.1459	16.98 $_{82}$	0.05889 $_{298}$	43
44	67.80 $_{360}$	44.0	619.9	575.9	541.0	34.9	0.1491	16.16 $_{77}$	0.06187 $_{310}$	44
45	71.40 $_{376}$	45.0	620.2	575.2	540.2	35.0	0.1522	15.39 $_{73}$	0.06497 $_{325}$	45
46	75.16 $_{394}$	46.0	620.5	574.5	539.4	35.1	0.1554	14.66 $_{69}$	0.06822 $_{338}$	46
47	79.10 $_{411}$	47.0	620.8	573.8	538.6	35.2	0.1585	13.97 $_{66}$	0.07160 $_{352}$	47
48	83.21 $_{430}$	48.0	621.1	573.1	537.8	35.3	0.1617	13.31 $_{62}$	0.07512 $_{366}$	48
49	87.51 $_{447}$	49.0	621.4	572.4	537.0	35.4	0.1648	12.69 $_{58}$	0.07878 $_{381}$	49
50	91.98 $_{467}$	50.0	621.8	571.8	536.3	35.5	0.1679	12.11 $_{55}$	0.08259 $_{394}$	50
51	96.65 $_{489}$	51.0	622.1	571.1	535.5	35.6	0.1710	11.56 $_{53}$	0.08653 $_{416}$	51
52	101.54 $_{510}$	52.1	622.4	570.3	534.6	35.7	0.1741	11.03 $_{50}$	0.09069 $_{428}$	52
53	106.64 $_{531}$	53.1	622.7	569.6	533.8	35.8	0.1772	10.53 $_{47}$	0.09497 $_{443}$	53
54	111.95 $_{554}$	54.1	623.0	568.9	533.0	35.9	0.1803	10.06 $_{45}$	0.09940 $_{470}$	54
55	117.49 $_{576}$	55.1	623.3	568.2	532.2	36.0	0.1833	9.610 $_{425}$	0.1041 $_{48}$	55
56	123.25 $_{601}$	56.1	623.6	567.5	531.4	36.1	0.1864	9.185 $_{403}$	0.1089 $_{50}$	56
57	129.26 $_{625}$	57.1	623.9	566.8	530.7	36.1	0.1895	8.782 $_{383}$	0.1139 $_{52}$	57
58	135.51 $_{651}$	58.1	624.2	566.1	529.9	36.2	0.1925	8.399 $_{363}$	0.1191 $_{54}$	58
59	142.02 $_{678}$	59.1	624.5	565.4	529.1	36.3	0.1956	8.036 $_{349}$	0.1245 $_{56}$	59
60	148.80 $_{705}$	60.1	624.8	564.7	528.3	36.4	0.1986	7.687 $_{325}$	0.1301 $_{57}$	60
61	155.85 $_{733}$	61.1	625.1	564.0	527.5	36.5	0.2016	7.362 $_{311}$	0.1358 $_{60}$	61
62	163.18 $_{762}$	62.1	625.4	563.3	526.7	36.6	0.2046	7.051 $_{297}$	0.1418 $_{63}$	62
63	170.80 $_{792}$	63.1	625.7	562.6	525.9	36.7	0.2076	6.754 $_{284}$	0.1481 $_{65}$	63
64	178.72 $_{823}$	64.2	626.0	561.8	525.0	36.8	0.2106	6.470 $_{269}$	0.1546 $_{67}$	64
65	186.95 $_{855}$	65.2	626.3	561.1	524.2	36.9	0.2136	6.201 $_{254}$	0.1613 $_{69}$	65
66	195.50 $_{888}$	66.2	626.6	560.4	523.4	37.0	0.2166	5.947 $_{242}$	0.1682 $_{71}$	66
67	204.38 $_{922}$	67.2	626.9	559.7	522.6	37.1	0.2196	5.705 $_{233}$	0.1753 $_{74}$	67
68	213.60 $_{957}$	68.2	627.2	559.0	521.8	37.2	0.2225	5.472 $_{222}$	0.1827 $_{78}$	68
69	223.17	69.2	627.5	558.3	521.0	37.3	0.2254	5.250	0.1905	69

Temperature, Degrees Centigrade. t	Pressure, Millimeters of Mercury. p		Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int\frac{cdt}{T}$	Specific Volume s		DENSITY. Weight, in Kilos, of one Cubic Meter. γ		Temperature, Degrees Centigrade. t
71	243.39	1068	71.2	628.2	557.0	519.5	37.5	0.2313	4.839	191	0.2067	84	**71**
72	254.07	1107	72.2	628.5	556.3	518.7	37.6	0.2342	4.648	183	0.2151	88	**72**
73	265.14	1148	73.2	628.8	555.6	517.9	37.7	0.2371	4.465	174	0.2239	91	**73**
74	276.62	1189	74.2	629.1	554.9	517.1	37.8	0.2400	4.291	167	0.2330	95	**74**
75	288.51	1232	75.2	629.4	554.2	516.3	37.9	0.2429	4.124	159	0.2425	97	**75**
76	300.83	1276	76.2	629.7	553.5	515.5	38.0	0.2458	3.965	152	0.2522	101	**76**
77	313.59	1321	77.3	630.0	552.7	514.6	38.1	0.2487	3.813	145	0.2623	103	**77**
78	326.80	1368	78.3	630.3	552.0	513.8	38.2	0.2516	3.668	139	0.2726	107	**78**
79	340.48	1415	79.3	630.6	551.3	513.0	38.3	0.2544	3.529	132	0.2833	111	**79**
80	354.63	1464	80.3	630.9	550.6	512.3	38.3	0.2573	3.397	127	0.2944	114	**80**
81	369.27	1514	81.3	631.2	549.9	511.5	38.4	0.2601	3.270	121	0.3058	118	**81**
82	384.41	1567	82.3	631.5	549.2	510.7	38.5	0.2630	3.149	116	0.3176	122	**82**
83	400.08	1619	83.3	631.8	548.5	509.9	38.6	0.2658	3.033	111	0.3298	125	**83**
84	416.27	1674	84.3	632.1	547.8	509.1	38.7	0.2686	2.922	107	0.3423	129	**84**
85	433.01	1730	85.3	632.4	547.1	508.3	38.8	0.2714	2.815	101	0.3552	133	**85**
86	450.31	1787	86.3	632.7	546.4	507.5	38.9	0.2742	2.714	98	0.3685	137	**86**
87	468.18	1846	87.3	633.0	545.7	506.7	39.0	0.2770	2.616	93	0.3822	143	**87**
88	486.64	1907	88.3	633.3	545.0	505.9	39.1	0.2798	2.523	90	0.3965	146	**88**
89	505.71	1969	89.4	633.6	544.2	505.0	39.2	0.2826	2.433	86	0.4111	149	**89**
90	525.40	2032	90.4	634.0	543.6	504.3	39.3	0.2854	2.347	82	0.4260	155	**90**
91	545.72	2098	91.4	634.3	542.9	503.6	39.3	0.2881	2.265	79	0.4415	160	**91**
92	566.70	2164	92.4	634.6	542.2	502.8	39.4	0.2909	2.186	76	0.4575	164	**92**
93	588.34	2233	93.4	634.9	541.5	502.0	39.5	0.2937	2.110	72	0.4739	169	**93**
94	610.67	2303	94.4	635.2	540.8	501.2	39.6	0.2964	2.038	70	0.4908	173	**94**
95	633.70	2375	95.4	635.5	540.1	500.4	39.7	0.2991	1.968	67	0.5081	180	**95**
96	657.45	2448	96.4	635.8	539.4	499.6	39.8	0.3019	1.901	65	0.5261	184	**96**
97	681.93	2524	97.4	636.1	538.7	498.8	39.9	0.3046	1.836	62	0.5445	191	**97**
98	707.17	2602	98.4	636.4	538.0	498.1	39.9	0.3073	1.774	59	0.5636	195	**98**
99	733.19	2681	99.4	636.7	537.3	497.3	40.0	0.3100	1.715	54	0.5831	193	**99**
100	760.00	275	100.4	637.0	536.6	496.4	40.2	0.3127	1.661	52	0.6024	195	**100**
101	787.5	283	101.4	637.3	535.9	495.6	40.3	0.3154	1.609	53	0.6219	208	**101**
102	815.8	292	102.5	637.6	535.1	494.7	40.4	0.3181	1.556	51	0.6427	218	**102**
103	845.0	301	103.5	637.9	534.4	493.9	40.5	0.3208	1.505	49	0.6645	223	**103**
104	875.1	309	104.5	638.2	533.7	493.2	40.5	0.3235	1.456	47	0.6868	229	**104**
105	906.0	319	105.5	638.5	533.0	492.4	40.6	0.3261	1.409	47	0.7097	236	**105**
106	937.9	328	106.5	638.8	532.3	491.6	40.7	0.3288	1.365	45	0.7333	243	**106**
107	970.7	337	107.5	639.1	531.6	490.8	40.8	0.3314	1.320	42	0.7576	249	**107**
108	1004.4	347	108.5	639.4	530.9	490.1	40.8	0.3341	1.278	40	0.7825	255	**108**
109	1039.1		109.5	639.7	530.2	489.3	40.9	0.3367	1.248		0.8080		**109**

Temperature, Degrees Centigrade. t	Pressure, Millimeters of Mercury. p	Diff.	Heat of the Liquid q	Total Heat. λ	Heat of Vaporization r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int \frac{dq}{T}$	Specific Volume s	Diff.	Density. Weight, in Kilos, of one Cubic Meter. γ	Diff.	Temperature, Degrees Centigrade. t
111	1111.4	377	111.5	640.4	528.9	487.8	41.1	0.3420	1.162	36	0.8608	275	111
112	1149.1	388	112.5	640.7	528.2	487.0	41.2	0.3446	1.126	35	0.8883	283	112
113	1187.9	398	113.5	641.0	527.5	486.3	41.2	0.3471	1.091	34	0.9166	290	113
114	1227.7	410	114.6	641.3	526.7	485.4	41.3	0.3498	1.057	32	0.9456	299	114
115	1268.7	420	115.6	641.6	526.0	484.6	41.4	0.3524	1.025	31	0.9755	305	115
116	1310.7	432	116.6	641.9	525.3	483.8	41.5	0.3550	0.9942	299	1.006	31	116
117	1353.9	444	117.6	642.2	524.6	483.1	41.5	0.3576	0.9643	289	1.037	32	117
118	1398.3	455	118.6	642.5	523.9	482.3	41.6	0.3601	0.9354	278	1.069	33	118
119	1443.8	467	119.6	642.8	523.2	481.5	41.7	0.3627	0.9076	268	1.102	33	119
120	1490.5	480	120.6	643.1	522.5	480.7	41.8	0.3653	0.8808	258	1.135	35	120
121	1538.5	492	121.6	643.4	521.8	480.0	41.8	0.3678	0.8550	250	1.170	35	121
122	1587.7	506	122.6	643.7	521.1	479.2	41.9	0.3704	0.8300	241	1.205	36	122
123	1638.3	518	123.6	644.0	520.4	478.4	42.0	0.3729	0.8059	233	1.241	37	123
124	1690.1	532	124.6	644.3	519.7	477.6	42.1	0.3755	0.7826	224	1.278	37	124
125	1743.3	545	125.6	644.6	519.0	476.8	42.2	0.3780	0.7602	216	1.315	36	125
126	1797.8	559	126.6	644.9	518.3	476.1	42.2	0.3805	0.7386	211	1.351	40	126
127	1853.7	573	127.7	645.2	517.5	475.2	42.3	0.3830	0.7175	202	1.391	40	127
128	1911.0	587	128.7	645.5	516.8	474.4	42.4	0.3856	0.6973	195	1.431	44	128
129	1969.7	601	129.7	645.8	516.1	473.6	42.5	0.3881	0.6778	187	1.475	42	129
130	2029.8	617	130.7	646.2	515.5	473.0	42.5	0.3906	0.6591	183	1.517	43	130
131	2091.5	633	131.7	646.5	514.8	472.2	42.6	0.3931	0.6408	177	1.560	45	131
132	2154.8	647	132.7	646.8	514.1	471.4	42.7	0.3955	0.6231	170	1.605	45	132
133	2219.5	663	133.7	647.1	513.4	470.6	42.8	0.3980	0.6061	165	1.650	46	133
134	2285.8	679	134.7	647.4	512.7	469.8	42.9	0.4005	0.5896	160	1.696	47	134
135	2353.7	695	135.7	647.7	512.0	469.1	42.9	0.4030	0.5736	153	1.743	48	135
136	2423.2	712	136.7	648.0	511.3	468.3	43.0	0.4054	0.5583	149	1.791	49	136
137	2494.4	728	137.7	648.3	510.6	467.5	43.1	0.4079	0.5434	143	1.840	51	137
138	2567.2	745	138.7	648.6	509.9	466.7	43.2	0.4103	0.5290	141	1.891	51	138
139	2641.7	762	139.8	648.9	509.1	465.9	43.2	0.4128	0.5149	136	1.942	53	139
140	2717.9	780	140.8	649.2	508.4	465.1	43.3	0.4152	0.5013	130	1.995	53	140
141	2795.9	798	141.8	649.5	507.7	464.3	43.4	0.4177	0.4883	127	2.048	55	141
142	2875.7	816	142.8	649.8	507.0	463.5	43.5	0.4201	0.4756	123	2.103	55	142
143	2957.3	835	143.8	650.1	506.3	462.8	43.5	0.4225	0.4633	119	2.158	57	143
144	3040.8	853	144.8	650.4	505.6	462.0	43.6	0.4249	0.4514	115	2.215	58	144
145	3126.1	872	145.8	650.7	504.9	461.2	43.7	0.4273	0.4399	112	2.273	59	145
146	3213.3	892	146.8	651.0	504.2	460.4	43.8	0.4297	0.4287	108	2.332	60	146
147	3302.5	911	147.8	651.3	503.5	459.6	43.9	0.4321	0.4179	105	2.392	62	147
148	3393.6	931	148.8	651.6	502.8	458.9	43.9	0.4345	0.4074	101	2.454	63	148

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151	3679.1	993	151.8	652.6	500.8	456.6	44.2	0.4417	0.3779	93	2.646	67	151
152	3778.4	1014	152.9	652.9	500.0	455.8	44.2	0.4440	0.3686	90	2.713	68	152
153	3879.8	1035	153.9	653.2	499.3	455.0	44.3	0.4464	0.3596	87	2.781	69	153
154	3983.3	1057	154.9	653.5	498.6	454.2	44.4	0.4488	0.3509	85	2.850	70	154
155	4089.0	1079	155.9	653.8	497.9	453.4	44.5	0.4511	0.3424	82	2.920	72	155
156	4196.9	1102	156.9	654.1	497.2	452.7	44.5	0.4536	0.3342	80	2.992	74	156
157	4307.1	1124	158.0	654.4	496.4	451.8	44.6	0.4560	0.3262	78	3.066	75	157
158	4419.5	1148	159.0	654.7	495.7	450.0	44.7	0.4584	0.3184	76	3.141	76	158
159	4534.3	1171	160.1	655.0	494.9	449.2	44.7	0.4608	0.3108	73	3.217	78	159
160	4651.4	1195	161.1	655.3	494.2	449.4	44.8	0.4633	0.3035	71	3.295	79	160
161	4770.9	1218	162.2	655.6	493.4	448.5	44.9	0.4657	0.2964	69	3.374	80	161
162	4892.7	1243	163.2	655.9	492.7	447.7	45.0	0.4681	0.2895	67	3.454	82	162
163	5017.	127	164.2	656.2	492.0	447.0	45.0	0.4705	0.2828	66	3.536	84	163
164	5144.	129	165.3	656.5	491.2	446.1	45.1	0.4729	0.2762	63	3.620	85	164
165	5273.	132	166.3	656.8	490.5	445.3	45.2	0.4752	0.2699	62	3.705	87	165
166	5405.	134	167.4	657.1	489.7	444.5	45.2	0.4776	0.2637	60	3.792	88	166
167	5539.	137	168.4	657.4	489.0	443.7	45.3	0.4800	0.2577	58	3.880	90	167
168	5676.	140	169.5	657.7	488.2	442.9	45.3	0.4824	0.2519	57	3.970	91	168
169	5816.	143	170.5	658.0	487.5	442.1	45.4	0.4847	0.2462	55	4.061	93	169
170	5959.	145	171.6	658.4	486.8	441.3	45.5	0.4871	0.2407	53	4.154	94	170
171	6104.	147	172.6	658.7	486.1	440.5	45.6	0.4895	0.2354	52	4.248	97	171
172	6251.	151	173.7	659.0	485.3	439.7	45.6	0.4918	0.2302	51	4.345	99	172
173	6402.	153	174.7	659.3	484.6	438.9	45.7	0.4941	0.2251	50	4.444	99	173
174	6555.	157	175.8	659.6	483.8	438.1	45.7	0.4965	0.2201	48	4.543	101	174
175	6712.	159	176.8	659.9	483.1	437.3	45.8	0.4988	0.2153	47	4.644	103	175
176	6871.	162	177.8	660.2	482.4	436.5	45.9	0.5011	0.2106	45	4.747	105	176
177	7033.	165	178.9	660.5	481.6	435.7	45.9	0.5035	0.2061	44	4.852	107	177
178	7198.	168	179.9	660.8	480.9	434.9	46.0	0.5058	0.2017	44	4.959	109	178
179	7366.	171	181.0	661.1	480.1	434.0	46.1	0.5081	0.1973	42	5.068	110	179
180	7537.	175	182.0	661.4	479.4	433.3	46.1	0.5104	0.1931	41	5.178	113	180
181	7712.	177	183.1	661.7	478.6	432.4	46.2	0.5127	0.1890	40	5.291	114	181
182	7889.	181	184.1	662.0	477.9	431.7	46.2	0.5150	0.1850	39	5.405	117	182
183	8070.	183	185.2	662.3	477.1	430.8	46.3	0.5173	0.1811	38	5.522	118	183
184	8253.	187	186.2	662.6	476.4	430.1	46.3	0.5196	0.1773	37	5.640	120	184
185	8440.	191	187.3	662.9	475.6	429.2	46.4	0.5219	0.1736	36	5.760	122	185
186	8631.	193	188.3	663.2	474.9	428.5	46.4	0.5242	0.1700	36	5.882	125	186
187	8824.	197	189.4	663.5	474.1	427.6	46.5	0.5264	0.1664	34	6.007	127	187
188	9021.	201	190.4	663.8	473.4	426.9	46.5	0.5287	0.1630	33	6.134	128	188
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.5310	0.1597		6.262		189

Temperature, Degrees Centigrade. t	Pressure, Millimeters of Mercury. p	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int \frac{c\,dt}{T}$	Specific Volume. s	Density. Weight, in Kilos, of one Cubic Meter. γ	Temperature, Degrees Centigrade. t
191	$9633._{211}$	193.5	664.8	471.3	424.6	46.7	0.5355	0.1532_{31}	6.525_{136}	191
192	$9844._{214}$	194.6	665.1	470.5	423.7	46.8	0.5377	0.1501_{30}	6.661_{137}	192
193	$10058._{218}$	195.6	665.4	469.8	423.0	46.8	0.5400	0.1471_{30}	6.798_{140}	193
194	$10276._{222}$	196.7	665.7	469.0	422.2	46.8	0.5422	0.1441_{29}	6.938_{142}	194
195	$10498._{226}$	197.7	666.0	468.3	421.4	46.9	0.5444	0.1412_{28}	7.080_{145}	195
196	$10724._{229}$	198.8	666.3	467.5	420.6	46.9	0.5467	0.1384_{27}	7.225_{147}	196
197	$10953._{233}$	199.8	666.6	466.8	419.8	47.0	0.5489	0.1357_{27}	7.372_{149}	197
198	$11186._{238}$	200.9	666.9	466.0	419.0	47.0	0.5511	0.1330_{27}	7.521_{151}	198
199	$11424._{240}$	201.9	667.2	465.3	418.2	47.1	0.5533	0.1303_{26}	7.672_{155}	199
200	$11664._{245}$	203.0	667.5	464.5	417.4	47.1	0.5555	0.1277_{25}	7.827_{157}	200
201	$11909._{249}$	204.0	667.8	463.8	416.7	47.1	0.5577	0.1252_{24}	7.984_{159}	201
202	$12158._{253}$	205.0	668.1	463.1	415.9	47.2	0.5599	0.1228_{24}	8.143_{162}	202
203	$12411._{257}$	206.1	668.4	462.3	415.1	47.2	0.5621	0.1204_{23}	8.305_{165}	203
204	$12668._{262}$	207.1	668.7	461.6	414.4	47.2	0.5643	0.1181_{23}	8.470_{169}	204
205	$12930._{265}$	208.2	669.0	460.8	413.5	47.3	0.5665	0.1158_{23}	8.639_{171}	205
206	$13195._{270}$	209.2	669.3	460.1	412.8	47.3	0.5687	0.1135_{22}	8.810_{174}	206
207	$13465._{274}$	210.3	669.6	459.3	412.0	47.3	0.5709	0.1113_{21}	8.984_{176}	207
208	$13739._{279}$	211.3	669.9	458.6	411.3	47.3	0.5731	0.1092_{21}	9.160_{178}	208
209	$14018._{283}$	212.4	670.2	457.8	410.4	47.4	0.5752	0.1071_{21}	9.338_{181}	209
210	$14301._{287}$	213.4	670.6	457.2	409.8	47.4	0.5774	0.1050_{20}	9.519_{185}	210
211	$14588._{292}$	214.5	670.9	456.4	409.0	47.4	0.5795	0.1030_{19}	9.704_{190}	211
212	$14880._{297}$	215.5	671.2	455.7	408.3	47.4	0.5817	0.1011_{19}	9.894_{189}	212
213	$15177._{301}$	216.5	671.5	455.0	407.6	47.4	0.5839	0.0992_{19}	10.08_{20}	213
214	$15478._{307}$	217.6	671.8	454.2	406.7	47.5	0.5860	0.0973_{19}	10.28_{20}	214
215	$15785._{311}$	218.6	672.1	453.5	406.0	47.5	0.5881	0.0954_{18}	10.48_{20}	215
216	$16096._{315}$	219.7	672.4	452.7	405.2	47.5	0.5903	0.0936_{18}	10.68_{21}	216
217	$16411._{321}$	220.7	672.7	452.0	404.5	47.5	0.5924	0.0918_{17}	10.89_{21}	217
218	$16732._{326}$	221.8	673.0	451.2	403.7	47.5	0.5945	0.0901_{17}	11.10_{21}	218
219	$17058._{331}$	222.8	673.3	450.5	403.0	47.5	0.5967	0.0884_{16}	11.31_{22}	219
220	17389.	223.9	673.6	449.7	402.2	47.5	0.5988	0.0868	11.53	220

TABLE IV.

SATURATED VAPOR OF ETHER.

FRENCH UNITS.

Temperature, Degrees Centigrade. t	Pressure, Millimeters of Mercury. p	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int \frac{cdt}{T}$	Specific Volume. s	Density. Weight, in Kilos, of one Cubic Meter. γ	Temperature, Degrees Centigrade. t
0	184.39	0.00	94.00	94.00	86.45	7.55	0.0000	1.278	0.782	0
10	286.83	5.32	98.44	93.12	85.37	7.75	0.01909	0.8440	1.185	10
20	432.78	10.70	102.78	92.08	84.13	7.95	0.03772	0.5741	1.742	20
30	634.80	16.14	107.00	90.86	82.72	8.14	0.05593	0.4013	2.492	30
40	907.04	21.63	111.11	89.48	81.15	8.33	0.07374	0.2877	3.746	40
50	1264.8	27.19	115.11	87.92	79.41	8.51	0.09117	0.2108	4.744	50
60	1725.0	32.80	119.00	86.20	77.53	8.67	0.1083	0.1580	6.329	60
70	2304.9	38.48	122.78	84.30	75.49	8.81	0.1250	0.1203	8.313	70
80	3022.8	44.21	126.44	82.23	73.32	8.91	0.1415	0.0932	10.73	80
90	3898.3	50.00	130.00	80.00	71.03	8.97	0.1576	0.0731	13.68	90
100	4953.3	55.86	133.44	77.58	68.62	8.96	0.1735	0.0577	17.33	100
110	6214.6	61.77	136.78	75.01	66.13	8.88	0.1891	0.0459	21.79	110
120	7719.2	67.74	140.00	72.26	63.57	8.69	0.2045	0.0364	27.47	120

TABLE V.

SATURATED VAPOR OF ALCOHOL.

FRENCH UNITS.

Temperature, Degrees Centigrade. t	Pressure, Millimeters of Mercury. p	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int \frac{cdt}{T}$	Specific Volume. s	DENSITY. Weight, in Kilos, of one Cubic Meter. γ	Temperature, Degrees Centigrade. t
0	12.70	0.00	236.5	236.50	223.38	13.12	0.0000	32.21	0.03105	**0**
10	24.23	5.59	244.4	238.81	225.29	13.52	0.01996	17.39	0.05750	**10**
20	44.46	11.42	252.0	240.58	226.56	14.02	0.04003	9.847	0.1016	**20**
30	78.52	17.49	258.0	240.51	226.03	14.48	0.06029	5.753	0.1738	**30**
40	133.69	23.71	262.0	238.29	223.44	14.85	0.08073	3.465	0.2886	**40**
50	219.90	30.21	264.0	233.79	218.69	15.10	0.1014	2.143	0.4666	**50**
60	350.21	37.37	265.0	227.63	212.38	15.25	0.1223	1.359	0.7358	**60**
70	541.15	44.58	265.2	220.62	205.28	15.34	0.1435	0.8855	1.129	**70**
80	812.91	52.11	265.2	213.09	197.69	15.40	0.1650	0.5921	1.689	**80**
90	1189.3	59.97	266.0	206.03	190.54	15.49	0.1868	0.4073	2.455	**90**
100	1697.6	68.18	267.3	199.12	183.54	15.58	0.2090	0.2874	3.479	**100**
110	2367.6	76.74	269.6	192.86	177.15	15.71	0.2315	0.2083	4.801	**110**
120	3231.7	85.67	272.5	186.83	170.97	15.86	0.2544	0.1544	6.477	**120**
130	4328.0	94.98	276.0	181.02	164.99	16.03	0.2776	0.1170	8.547	**130**
140	5674.6	104.70	280.5	175.80	159.55	16.25	0.3013	0.0905	11.05	**140**
150	7318.4	114.82	285.3	170.48	154.03	16.45	0.3254	0.0714	14.01	**150**

TABLE VI.

SATURATED VAPOR OF CHLOROFORM.

FRENCH UNITS.

Temperature, Degrees Centigrade. t	Pressure, Millimeters of Mercury. p	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int\frac{cdt}{T}$	Specific Volume. s	DENSITY. Weight, in Kilos, of one Cubic Meter. γ	Temperature, Degrees Centigrade. t
0	59.72	0.00	67.00	67.00	62.45	4.55	0.00000	2.377	0.4207	0
10	100.47	2.33	68.38	66.04	61.29	4.75	0.00836	1.475	0.6780	10
20	160.47	4.67	69.75	65.08	60.14	4.94	0.01646	0.9601	1.042	20
30	247.51	7.02	71.12	64.10	59.00	5.10	0.02432	0.6437	1.554	30
40	369.26	9.37	72.50	63.13	57.87	5.26	0.03196	0.4449	2.248	40
50	535.05	11.74	73.87	62.13	56.73	5.40	0.03940	0.3155	3.170	50
60	755.44	14.12	75.25	61.13	55.60	5.53	0.04664	0.2291	4.356	60
70	1042.1	16.51	76.62	60.11	54.45	5.66	0.05369	0.1700	5.88	70
80	1407.6	18.91	78.00	59.09	53.31	5.78	0.06057	0.1286	7.78	80
90	1865.2	21.32	79.37	58.05	52.16	5.89	0.06729	0.0991	10.09	90
100	2428.5	23.74	80.75	57.01	51.01	6.00	0.07386	0.0777	12.87	100
110	3111.0	26.17	82.12	55.95	49.84	6.11	0.08027	0.0618	16.18	110
120	3925.7	28.61	83.50	54.89	48.67	6.22	0.08655	0.0500	20.00	120
130	4885.1	31.06	84.87	53.81	47.48	6.33	0.09270	0.0410	24.39	130
140	6000.2	33.52	86.25	52.73	46.30	6.43	0.09872	0.0340	29.4	140
150	7280.6	35.99	87.62	51.63	45.10	6.53	0.10462	0.0286	35.0	150
160	8734.2	38.47	89.00	50.53	43.90	6.63	0.11041	0.0243	41.2	160

TABLE VII.

SATURATED VAPOR OF CARBON BISULPHIDE.

FRENCH UNITS.

Temprature, Degrees Centigrade. t	Pressure, Millimeters of Mercury. p	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat-equivalent of Internal Work. ρ	Heat-equivalent of External Work. Apu	Entropy of the Liquid. $\int \frac{dq}{T}$	Specific Volume. s	Density. Weight, in Kilos, of One Cubic Meter. γ	Temperature, Degrees Centigrade. t
0	127.91	0.00	90.00	90.00	82.79	7.21	0.00000	1.760	0.5682	0
10	198.46	2.39	91.42	89.03	81.58	7.48	0.00847	1.177	0.8496	10
20	298.03	4.74	92.76	88.02	80.31	7.71	0.01670	0.8071	1.239	20
30	434.62	7.13	94.01	86.88	78.97	7.91	0.02472	0.5684	1.759	30
40	617.53	9.54	95.18	85.64	77.54	8.10	0.03252	0.4098	2.440	40
50	857.07	11.96	96.27	84.31	76.04	8.27	0.04013	0.3017	3.315	50
60	1164.5	14.41	97.28	82.87	74.45	8.42	0.04756	0.2264	4.417	60
70	1552.1	16.89	98.20	81.31	72.78	8.53	0.05482	0.1726	5.794	70
80	2032.5	19.34	99.04	79.70	71.63	8.07	0.06192	0.1338	7.473	80
90	2619.1	21.83	99.80	77.97	69.20	8.77	0.06886	0.1052	9.51	90
100	3325.2	24.34	100.48	76.14	67.29	8.85	0.07566	0.0837	11.95	100
110	4164.1	26.86	101.07	74.21	65.31	8.90	0.08233	0.0674	14.84	110
120	5148.8	29.40	101.58	72.18	63.24	8.94	0.08886	0.0549	18.21	120
130	6291.6	31.96	102.01	70.05	61.09	8.96	0.09527	0.0452	22.12	130
140	7604.0	34.53	102.36	67.83	58.88	8.95	0.10157	0.0375	26.7	140
150	9095.9	37.12	102.62	65.50	56.58	8.92	0.10775	0.0314	31.8	150

TABLE VIII.

SATURATED VAPOR OF CARBON TETRACHLORIDE.

FRENCH UNITS.

Temperature, Degrees Centigrade. t	Pressure, Millimeters of Mercury. p	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int \frac{cdt}{T}$	Specific Volume. s	Density. Weight, in Kilos, of one Cubic Meter. γ	Temperature, Degrees Centigrade. t
0	32.95	0.00	52.00	52.00	48.54	3.46	0.00000	3.272	0.3056	0
10	55.97	1.99	53.44	51.45	47.85	3.60	0.00714	2.005	0.4987	10
20	90.99	3.99	54.86	50.87	47.13	3.74	0.01409	1.283	0.7794	20
30	142.27	6.02	56.23	50.21	46.33	3.88	0.02087	0.8510	1.175	30
40	214.81	8.06	57.58	49.52	45.51	4.01	0.02749	0.5831	1.715	40
50	314.38	10.12	58.88	48.76	44.62	4.14	0.03396	0.4109	2.434	50
60	447.43	12.20	60.16	47.96	43.69	4.25	0.04028	0.2969	3.368	60
70	621.15	14.30	61.40	47.10	42.75	4.35	0.04648	0.2192	4.562	70
80	843.29	16.42	62.60	46.18	41.74	4.44	0.04255	0.1650	6.061	80
90	1122.3	18.55	63.77	45.22	40.50	4.72	0.05849	0.1263	7.92	90
100	1467.1	20.70	64.90	44.20	39.62	4.58	0.06433	0.0980	10.20	100
110	1887.4	22.87	66.01	43.14	38.52	4.62	0.07006	0.0770	12.99	110
120	2393.7	25.06	67.07	42.01	37.36	4.65	0.07569	0.0611	16.37	120
130	2996.9	27.27	68.10	40.83	36.18	4.65	0.08122	0.0490	20.41	130
140	3709.0	29.49	69.10	39.61	34.95	4.63	0.08666	0.0395	25.3	140
150	4543.1	31.73	70.07	38.34	33.75	4.59	0.09201	0.0321	31.2	150
160	5513.1	34.00	71.00	37.00	32.47	4.53	0.09720	0.0262	38.2	160

TABLE IX.

SATURATED VAPOR OF ACETON.

FRENCH UNITS.

Temperature, Degrees Centigrade. t	Pressure, Millimeters of Mercury. p	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int \frac{c\,dt}{T}$	Specific Volume. s	DENSITY. Weight, in Kilos, of one Cubic Meter. γ	Temperature, Degrees Centigrade. t
0	63.33	0.00	140.50	140.50	131.82	8.68	0.00000	4.275	0.2339	0
10	110.32	5.10	144.11	139.01	129.51	9.50	0.01842	2.686	0.3723	10
20	180.08	10.29	147.62	137.33	127.16	10.17	0.03627	1.758	0.5688	20
30	280.05	15.55	151.03	135.48	124.83	10.65	0.05389	1.187	0.8425	30
40	419.35	20.89	154.33	133.44	122.39	11.05	0.07119	0.8227	1.215	40
50	608.81	26.31	157.53	131.22	119.86	11.36	0.08820	0.5830	1.715	50
60	860.96	31.81	160.63	128.82	117.22	11.60	0.1049	0.4215	2.372	60
70	1189.9	37.39	163.62	126.23	114.43	11.80	0.1214	0.3106	3.220	70
80	1611.1	43.05	166.51	123.46	111.49	11.97	0.1376	0.2328	4.296	80
90	2140.8	48.79	169.30	120.51	108.41	12.10	0.1536	0.1773	5.640	90
100	2796.2	54.61	171.98	117.37	105.17	12.20	0.1694	0.1372	7.289	100
110	3594.3	60.50	174.56	114.06	101.78	12.28	0.1850	0.1076	9.294	110
120	4552.0	66.48	177.04	110.56	98.23	12.33	0.2004	0.0856	11.68	120
130	5684.0	72.54	179.42	106.88	94.53	12.35	0.2156	0.0689	14.51	130
140	7007.0	78.67	181.69	103.02	90.67	12.35	0.2306	0.0561	17.83	140

TABLE X.

SATURATED VAPOR OF AMMONIA.

ENGLISH UNITS.

Temperature, Degrees Fahrenheit.	Pressure, Pounds per Square Inch.	Heat of the Liquid.	Total Heat.	Heat of Vaporization.	Heat equivalent of Internal Work.	Heat equivalent of External Work.	Entropy of the Liquid.	Specific Volume.	Density — Weight, in pounds, of one Cubic Foot.	Temperature. Degrees Fahrenheit.
t	p	q	λ	r	ρ	Apu	$\int \frac{c\,dt}{T}$	s	γ	t
−40	9.93	−79	519	598	549	49	−0.1737	26.9	0.0373	−40
−35	11.53	−74	520	594	544	50	−0.1607	23.3	0.0429	−35
−30	13.36	−68	522	590	540	50	−0.1482	20.3	0.0492	−30
−25	15.40	−63	523	586	535	51	−0.1354	17.8	0.0562	−25
−20	17.70	−57	525	582	531	51	−0.1229	15.6	0.0640	−20
−15	20.25	−52	526	578	526	52	−0.1103	13.7	0.0726	−15
−10	23.10	−46	528	574	522	52	−0.0982	12.2	0.0821	−10
−5	26.25	−41	529	570	517	53	−0.0859	10.8	0.0925	−5
0	29.74	−35	531	566	513	53	−0.0738	9.63	0.104	0
5	33.58	−30	532	562	508	53	−0.0619	8.60	0.116	5
10	37.80	−24	534	558	504	54	−0.0501	7.71	0.130	10
15	42.43	−19	535	554	500	54	−0.0386	6.93	0.144	15
20	47.49	−13	537	550	495	55	−0.0271	6.24	0.160	20
25	53.01	−8	538	546	491	55	−0.0157	5.64	0.177	25
30	59.01	−2	540	543	486	56	−0.0044	5.11	0.196	30
35	65.58	3	541	538	482	56	0.0067	4.64	0.216	35
40	72.59	9	543	534	478	56	0.0177	4.20	0.237	40
45	80.21	14	544	530	473	57	0.0287	3.85	0.260	45
50	88.44	20	546	526	469	57	0.0395	3.52	0.284	50
55	97.30	25	547	522	464	58	0.0502	3.22	0.310	55
60	106.82	31	549	518	460	58	0.0608	2.96	0.338	60
65	117.04	36	550	514	456	58	0.0713	2.72	0.367	65
70	127.98	42	552	510	451	59	0.0817	2.51	0.398	70
75	139.67	47	553	506	447	59	0.0921	2.32	0.431	75
80	152.15	53	555	502	442	60	0.1023	2.14	0.467	80
85	165.47	58	556	498	438	60	0.1124	1.99	0.504	85
90	179.64	64	558	494	434	60	0.1224	1.82	0.548	90
95	194.70	69	559	490	428	61	0.1324	1.71	0.584	95
100	210.70	75	561	486	425	61	0.1423	1.59	0.627	100

Table XI.

SATURATED VAPOR OF SULPHUR DIOXIDE.

ENGLISH UNITS,

Temperature, Degrees Fahrenheit. t	Pressure, Pounds per Square Inch. p	Heat of the Liquid. q	Total Heat. λ	Heat of Vaporization. r	Heat equivalent of Internal Work. ρ	Heat equivalent of External Work. Apu	Entropy of the Liquid. $\int \frac{cdt}{T}$	Specific Volume. s	Density. Weight in pounds, of one Cubic Foot. γ	Temperature, Degrees Fahrenheit. t
−40	3.14	−29	166	195	182	13	−0.0632	23.0	0.0434	−40
−35	3.70	−27	167	194	180	14	−0.0584	19.7	0.0507	−35
−30	4.34	−25	168	193	179	14	−0.0539	17.0	0.0590	−30
−25	5.07	−23	168	191	177	14	−0.0492	14.7	0.0682	−25
−20	5.90	−21	169	190	176	14	−0.0447	12.7	0.0785	−20
−15	6.83	−19	170	189	175	14	−0.0401	11.1	0.0901	−15
−10	7.88	−17	170	187	173	14	−0.0357	9.73	0.103	−10
−5	9.05	−15	171	186	172	14	−0.0312	8.56	0.117	−5
0	10.35	−13	172	185	170	15	−0.0268	7.54	0.133	0
5	11.81	−11	172	183	168	15	−0.0225	6.67	0.150	5
10	13.41	−9	173	182	167	15	−0.0182	5.93	0.169	10
15	15.19	−7	174	181	166	15	−0.0140	5.29	0.189	15
20	17.15	−5	174	179	164	15	−0.0098	4.72	0.212	20
25	19.30	−3	175	178	163	15	−0.0057	4.23	0.236	25
30	21.66	−1	176	177	162	15	−0.0016	3.81	0.263	30
35	24.24	1	176	175	160	15	0.0024	3.43	0.291	35
40	27.06	3	177	174	158	16	0.0064	3.10	0.322	40
45	30.12	5	177	172	156	16	0.0104	2.81	0.356	45
50	33.45	7	178	171	155	16	0.0144	2.58	0.390	50
55	37.07	9	179	170	154	16	0.0182	2.32	0.430	55
60	40.98	11	179	168	152	16	0.0221	2.11	0.473	60
65	45.20	13	180	167	151	16	0.0259	1.94	0.516	65
70	49.75	15	181	166	150	16	0.0297	1.78	0.563	70
75	54.64	17	181	164	148	16	0.0334	1.63	0.614	75
80	59.90	19	182	163	146	17	0.0372	1.50	0.668	80
85	65.54	21	183	162	145	17	0.0409	1.38	0.725	85
90	71.57	23	183	160	143	17	0.0445	1.27	0.786	90
95	78.02	25	184	159	142	17	0.0482	1.18	0.849	95
100	84.90	27	185	158	141	17	0.0518	1.09	0.917	100

TABLE XII.

SPECIFIC GRAVITY AND SPECIFIC VOLUME OF LIQUIDS.

Name of Liquid.	Specific Gravity, compared with Water at 4° C.	Specific Volume. Cubic Meters per Kilo.
Alcohol, C_2H_6O	0.80625 [Mendelejeff, 1860]	0.001240
Ether, $C_4H_{10}O$	0.736 [Kopp, 1860]	0.001358
Chloroform	1.527 [Thorpe, 1880]	0.000655
Carbon bisulphide, CS_2	1.2922 [Thorpe, 1880]	0.000774
Carbon tetrachloride, CCl_4	1.6320 [Thorpe, 1880]	0.000613
Aceton, C_3H_6O	0.81 [Zander, 1882]	0.00123
Sulphur Dioxide SO_2	1.4336 [Andréeff, 1859]	0.0006981
Ammonia NH_3	0.6364 [Andréeff, 1859]	0.001571

TABLE XIII.

VOLUME OF WATER.

Vol. at 4° C=1.

[Rossetti, 1871] and [Hirn, 1867.]

Temperature.	Volume.	Temperature.	Volume.	Temperature.	Volume.	Temperature.	Volume.
10	1.000253	60	1.01691	110	1.0512	160	1.1018
20	1.001744	70	1.02256	120	1.0590	170	1.1130
30	1.00425	80	1.02887	130	1.0694	180	1.1268
40	1.00770	90	1.03507	140	1.0795	190	1.1403
50	1.01105	100	1.04312	150	1.0903	200	1.1544

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7.9	2.0668	2.0681	2.0694	2.0707	2.0719	2.0732	2.0744	2.0757	2.0769	2.0782
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